



Disponible en ligne sur  
**SciVerse ScienceDirect**  
www.sciencedirect.com

Elsevier Masson France  
**EM|consulte**  
www.em-consulte.com/en



Original article

## Factorial structure and psychometric properties of the French adaptation of the Dissociative Experiences Scale (DES) in non-clinical participants

### *Structure factorielle et propriétés psychométriques d'une adaptation française de l'échelle d'expériences dissociatives (DES) chez des sujets non cliniques*

F. Larøi<sup>a,\*</sup>, J. Billieux<sup>b,c,1</sup>, A.-C. Defeldre<sup>b</sup>, G. Ceschi<sup>c</sup>, M. Van der Linden<sup>a,c</sup>

<sup>a</sup> Department of Psychology: Cognition and behaviour, University of Liège, boulevard du Rectorat (B33), 4000 Liège, Belgium

<sup>b</sup> Catholic University of Louvain, Louvain-la-Neuve, Belgium

<sup>c</sup> University of Geneva, Geneva, Switzerland

#### ARTICLE INFO

##### Article history:

Received 24 November 2010  
Received in revised form 12 February 2013  
Accepted 26 April 2013

##### Keywords:

Dissociation  
Dissociative experiences scale  
Psychometric properties  
Confirmatory factor analysis

##### Mots clés :

Dissociation  
Échelle d'expériences dissociatives  
Propriétés psychométriques  
Analyse factorielle confirmatoire

#### ABSTRACT

**Introduction.** – The Dissociative Experiences Scale (DES) is a widely used instrument for assessing dissociation. However, there is disagreement regarding the internal structure of the DES and scores tend to be highly skewed.

**Objective.** – The present study was designed to test the psychometric properties of a French version of the DES in non-clinical participants, in addition to applying a response scale as recommended by Wright and Loftus (1999) in order to resolve the problem of skewed scores.

**Results.** – Exploratory and confirmatory factor analysis (computed in two independent samples) suggested a two-factor solution, which seem to represent two forms of dissociation (“automatic pilot” related dissociation episodes and “defensive” dissociation episodes). Results also revealed high internal consistency, and satisfactory results in terms of skewness and floor effects. Finally, significant associations with other measures (anxiety, depression, traumatic experiences) indicate good concurrent validity.

**Conclusions.** – This study offers evidence that the present version of the French adaptation of the DES reveals good psychometric properties. Analyses of the internal structure of the DES suggest that two types of dissociative experiences are being measured: automatic pilot-related dissociation episodes (e.g., associated with different types of cognitive failures) and defensive dissociation episodes that may act as defensive mechanisms, especially in persons who have been traumatized (e.g., the avoidance of a memory related to a traumatic event).

© 2013 Published by Elsevier Masson SAS.

#### R É S U M É

**Introduction.** – L'échelle des expériences dissociatives (DES) est fréquemment utilisée afin d'évaluer les phénomènes de dissociation. Cependant, il n'existe pas à ce jour de consensus concernant sa structure factorielle. En outre, les scores obtenus avec la DES dans des populations non cliniques tendent à être asymétriques (effets planchers).

**Objectif.** – La présente étude a pour objectif, au sein d'un échantillon de participants non cliniques, d'analyser les propriétés psychométriques et la structure factorielle d'une version française de la DES. Dans le but de réduire l'asymétrie des réponses fournies, nous avons également adapté la DES sur base de l'échelle de réponse proposée par Wright et Loftus (1999).

**Résultats.** – Des analyses factorielles exploratoires et confirmatoires (effectuées dans deux échantillons indépendants) ont suggéré une solution à deux facteurs, qui semble représenter deux formes de dissociation (dissociations liées à un fonctionnement en «pilote automatique» et dissociations de type «défensive»). Cette version de la DES présente une bonne consistance interne, et l'utilisation d'une nouvelle modalité de réponse s'avère efficace pour neutraliser les effets planchers

\* Corresponding author.

E-mail address: flaroi@ulg.ac.be (F. Larøi).

<sup>1</sup> Please note that Frank Larøi and Joël Billieux equally contributed to this paper and are willing to share first authorship.

(asymétrie des scores) fréquemment obtenus avec cette échelle chez des participants non cliniques. Pour terminer, des associations significatives avec d'autres mesures (anxiété, dépression, expériences traumatisantes) indiquent une bonne validité concurrente.

**Conclusions.** – Les résultats de cette étude indiquent que cette version française de la DES dispose de bonnes propriétés psychométriques. Cette échelle mesure deux types d'expériences dissociatives : les expériences dissociatives de type pilote automatique (e.g., associées à un mode de traitement de l'information automatique plutôt que contrôlé) et les expériences dissociatives défensives (e.g., l'évitement de souvenirs reliés à un événement traumatique).

© 2013 Publié par Elsevier Masson SAS.

According to the Diagnostic and Statistical Manual of Mental Disorders-IV, dissociation refers to a "disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment" (American Psychiatric Association, 1994). Dissociation occurs in a wide range of psychiatric disorders such as post-traumatic stress disorder, eating disorders, phobia, depression, schizophrenia, and obsessive compulsive disorders (Holmes et al., 2005). Foote, Smolin, Kaplan, Legatt, & Lipschitz (2006), for instance, found that dissociative disorders were present in as many as 29% of their sample of psychiatric patients from an outpatient clinic. Sar et al. (2007) report that 35% of patients from a psychiatric emergency ward were diagnosed as having a dissociative disorder.

There has also been great interest in assessing dissociative experiences in non-clinical populations, primarily based on the idea that dissociation may lie on a continuum in the general population, ranging from minor dissociations in everyday life to major forms of psychopathology such as multiple personality disorder (Bernstein & Putnam, 1986). Indeed, prevalence rates of dissociation in non-clinical populations have been estimated at 11%, with high levels of dissociation occurring in 2–6% of the general population (Mulder, Beautrais, Joyce, & Fergusson, 1998; Putnam et al., 1996; Waller & Ross, 1997). Furthermore, studies also reveal that dissociation in non-clinical samples is associated with depression, anxiety and traumatic experiences (Holtgraves & Stockdale, 1997; Maaranen et al., 2005; Merckelbach & Muris, 2001; Merckelbach, Horselenberg, Schmidt, 2002; Mulder et al., 1998; Seedat et al., 2003). For instance, in a general population study involving 1028 participants, Mulder et al. (1998) found that childhood traumatic circumstances (physical and sexual abuse) were significantly related to dissociation, and that those who met DSM-III-R criteria for a mood disorder, anxiety and post-traumatic stress disorder, all displayed higher dissociation scores compared to those who did not meet such criteria.

One of the most commonly used self-report measures of dissociative experiences is the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). A number of studies have revealed that the DES possesses highly adequate psychometric properties in terms of reliability (Van Ijzendoorn & Schuengel, 1996), test-retest stability (Bernstein & Putnam, 1986; Dubester & Braun, 1995; Frischholz et al., 1990), internal consistency (Bernstein & Putnam, 1986; Dubester & Braun, 1995; Ray & Faith, 1995; Ray, June, Turaj, & Lundy, 1992), predictive validity (Van Ijzendoorn & Schuengel, 1996), and convergent validity (Van Ijzendoorn & Schuengel, 1996).

However, despite the fact that a large number of studies have examined the psychometric properties of the DES, two problematic issues remain. The first issue is associated with conflicting results regarding the internal structure of the DES, in particular, regarding findings from non-clinical samples. When using clinical populations there is general agreement among authors that a multiple-factor solution, compared to a single-factor solution, is the most adequate one. For example, based on principal components analysis, Darves-Bornoz, Degiovanni and Gaillard (1999) reported a three-factor solution of the French version of the DES as being the

most adequate solution in their sample of 140 rape victims. More specifically, the three extracted factors consisted of Depersonalization and Derealization, Amnesic Fragmentation of identity, and Absorption and Imaginative involvement. However, in this study a highly dissociated sample was included, as it consisted exclusively of rape victims. Also, the sample was predominantly female (91%). Moreover, only exploratory factor analysis (EFA) was carried out, which has been criticized (see below).

Studies looking exclusively at non-clinical samples have resulted in little agreement concerning the most adequate factor structure. Studies argue for single (Fischer & Elnitsky, 1990; Holtgraves & Stockdale, 1997; Wright & Loftus, 1999), two (Waller, Putnam, & Carlson, 1996), three (Ross, Joshi, Currie, 1991; Sanders & Green, 1994; Stockdale, Gridley, Balogh, & Holtgraves, 2002), four (Ray & Faith, 1995) and seven (Ray et al., 1992) factor solutions for the DES. However, again, many of these studies limited their analyses to EFA and did not compute CFA on their samples. There are a number of limitations to EFA. For instance, although EFA is a useful data-driven approach when there is no sufficient theoretical and empirical basis to specify a model (or a small number of models), confirmatory factor analysis (CFA) remains necessary to test specific hypotheses about the structure of the data to determine whether a proposed model fits them.

The second issue is related to the problem of skewed DES scores in both non-clinical and clinical samples. Specifically, most studies with non-clinical participants report the data for individual questions and for overall scores to be highly skewed (Ray & Faith, 1995; Ross, 1997; Ross et al., 1991) and often clustered at the low end of the scale, creating floor effects. Indeed, the issue of skewed scores was already observed and pointed out in the original DES validation study (Bernstein & Putnam, 1986). As mentioned by Wright and Loftus (1999), the presence of skewed distribution of scores (especially in non-clinical participants) is perhaps not very surprising considering the fact that the items for the DES were constructed from the clinical literature and experiences with clinical samples. Skewed distributions are problematic for a number of reasons. For instance, they negatively affect statistical procedures (e.g., factor analysis), reduce the reliability of a measure, and limit the types of statistical procedures (e.g., correlation coefficients, *t* tests) one may use to analyze variables.

In an effort to deal with this important issue, Wright and Loftus (1999) administered three forms of the DES to groups of non-clinical individuals, each containing a different response form. All response forms contained eleven boxes that participants had to place a tick in. In the first form (DES-II), participants were asked how often each experience happens to them in terms of percentages (from 0% to 100%, containing 11 boxes at 10% increments). The second response form (DES-VQ) asked respondents how often each of the experience happens to them with the help of five verbal quantifiers (i.e., 'never', 'occasionally', 'fairly often', 'very often', 'always'). Finally, the third version (DES-C) asked people how often they have these experiences compared with other people. One end of the scale had the label "much less than others", the other end "much more than others", and the midpoint of the scale "about the

same as others". Results revealed that the last form (DES-C) was superior in avoiding floor effects and skewness.

The main goal of the present study was to test the psychometric properties of a French version of the DES in addition to applying a response scale as recommended by Wright and Loftus (1999), in order to provide French-speaking researchers with a valid and reliable instrument for assessing dissociative phenomena in non-clinical populations. To do so, a two-step strategy was adopted. In a first study, the construct validity of the DES was investigated through EFA and other exploratory analyses. In a second study, a CFA was applied on the factor structure found in the first study, albeit in a different sample of participants. Indeed, the conjoint use of EFA and CFA in two independent samples allows a rigorous determination of the factorial structure of a scale (Fabrigar, Wegener, MacCallum, & Strahan, 1999), which furthermore has never been done in previous studies examining the psychometric properties of the DES. Moreover, in study 2, the factor structure observed in study 1 was compared with other factor structures of the DES that have been previously reported in the research literature. Finally, in the second study, and in order to assess convergent validity, we also examined the relationships between the DES and other questionnaires assessing depression, anxiety and exposition to traumatic experiences.

## 1. Study 1

The first study was conducted to establish the factor structure of the DES through EFA. This technique is suited when there is relatively little theoretical or empirical basis to make strong assumptions about the number of factors of an instrument, which was the case for the DES. In this first study, we were also interested in exploring whether the response distribution of the DES revealed problematic skewness or floor effects.

### 1.1. Method

#### 1.1.1. Participants and procedure

The current sample consisted of 188 University students (103 females), with an average age of 21.7 years (range=17–31; SD=2.73). Since the DES assumes that participants are capable of understanding subtle distinctions in question meaning, native or fluent French speakers were only included. All participants filled out the French version of the DES in conditions that guaranteed anonymity.

#### 1.1.2. Measure

The DES is a 28-item, self-report instrument for the measurement of dissociative experiences. Darves-Bornoz et al. (1999) translated and validated the French version of the DES<sup>2</sup> utilized in the present study. Results from Darves-Bornoz et al. (1999) revealed that the French version had adequate psychometric properties. Furthermore, and based on recommendations from Wright and Loftus (1999), we modified the response form of the DES so that respondents were asked to rate how often they experienced each of the 28 described situation compared to other people. One end of the scale was labeled "much less than others", the other end was labeled "much more than others", and the midpoint of the scale was labeled "about the same as others". Participants were asked to place a tick in one of the 11 boxes above the response.

<sup>2</sup> The version of the French DES used in the present study is available upon request from the corresponding author.

### 1.2. Results

An EFA was computed in order to examine the internal structure of the DES. Out of the 188 participants, one had an item with a missing value and was therefore excluded. The number of factors to extract was determined by Velicer's Minimum Average Partial (MAP) test performed on the correlation matrix (Velicer, 1976). The MAP test is suitable since it provides the optimal number of factors to retain. The MAP test recommended extracting two factors. Then, the covariance matrix was analyzed with EFA using Oblimin rotation to allow correlations among factors. The minimum loading of each item was greater than .30 (Table S1). The sums of square loadings were 10.43, and 2.06, respectively. The two factors accounted for 44.60% (Factor 1: 37.25%; Factor 2: 7.35%). It should be noted that item 10 and item 22 loaded relatively similarly on Factor 1 and Factor 2. Factor 1 comprises items 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 22, 26, 27, 28, and Factor 2 comprises items 1, 2, 14, 15, 17, 18, 19, 20, 21, 23, 24, 25.

Internal consistency for each factor was evaluated with Cronbach's  $\alpha$  coefficient, resulting in .93 for Factor 1 and .85 for Factor 2, which corresponds to a very good internal consistency. Corrected item-to-total score correlations (the correlation of each item with the total score corrected by excluding the given item from calculation of the total score) were highly significant, with Pearson  $r$  values ranging from 0.52 to 0.76. Scores for male and female participants were considered by computing Pearson's point-biserial correlations. To this end, women were set at  $-1$  and men at  $1$ . Thus, a positive correlation corresponds to a higher score for men whereas a negative correlation corresponds to a higher score for women. Based on this, there were no gender differences for both Factor 1,  $r_{pb} = -.00$ ,  $CI = (-.15, .14)$ , and Factor 2,  $r_{pb} = .02$ ,  $CI = (-.12, .16)$ .

Means and skewness for each item and overall score were calculated<sup>3</sup>. The mean total score in the present study was 38.4. Results revealed highly adequate results in terms of skewness and floor effects. The highest skewness value was 0.6 and the total skewness value was essentially normal (average = 0.1). Results also revealed that floor effects were avoided, with the lowest mean score (i.e., item 4) being 21.

## 2. Study 2

The purpose of the second study was to test the 2-factor structure of the DES found in study 1 with a new sample of participants by using CFA and to compare this model to previous models proposed for the DES. In addition, in order to evaluate the concurrent validity of the French translation of the DES, other measures were administered to participants that measure trait anxiety, depression, and post-traumatic stress symptoms.

### 2.1. Method

#### 2.1.1. Participants and procedure

A total of 210 university students (175 females) took part in study 2. The mean age of the sample was 21.68 years (range = 16–45; SD = 3.87). As in Study 1, only native or fluent French speakers were incorporated. A part of this second sample ( $n = 103$ ; 91 females) also completed questionnaires assessing trait anxiety, depression, and post-traumatic stress symptoms. All participants filled out the various questionnaires in conditions that guaranteed anonymity.

<sup>3</sup> Means, standard deviations, skewness and kurtosis values for individual DES items may be obtained upon request from the corresponding author.

### 2.1.2. Measures

The French version (Bruchon-Schweitzer & Paulhan, 1993) of the State-Trait Anxiety Inventory-Trait (STAI-T; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) consists of 20 items designed to assess general trait anxiety. Items on the scale are scored from 1 = “not at all” to 4 = “very much so.” The reliability coefficient (Cronbach’s  $\alpha$ ; with no missing values) on STAI-T items in our sample was 0.89. The French version of Beck’s Depression Inventory II (BDI-II; Beck, Steer, & Brown, 1996) consists of 21 items that assess depressive symptoms. Each item is a list of four statements about a particular symptom of depression arranged in order of increasing severity; high scores suggest intense depression. The reliability coefficient (Cronbach’s  $\alpha$ ; with no missing values) on BDI-II items in our sample was 0.84. The French version (Brunet, St.Hilaire, Jehel, & King, 2003) of the Impact of Event Scale-Revised (IES-R; Weiss & Marmar, 1997) consists of 22 items that measure symptoms of intrusions, avoidance and numbing, and hyperarousal with respect to a particular life-threatening event. Participants rate the extent to which each item applies to their experiences during the preceding 7 days on a 5-point Likert scale. The reliability coefficient (Cronbach’s  $\alpha$ ; with no missing values) on IES-R items in our sample was 0.93.

### 2.2. Results

The two-factor structure found in study 1 was tested through a CFA computed with Mplus (Muthén & Muthén, 2006). Goodness of fit was tested with the  $\chi^2$  (a non-significant value corresponds to an acceptable fit). However,  $\chi^2$  is known to increase with sample size, and it has been emphasized (Byrne, 1994) that it is unusual to obtain a non-significant  $\chi^2$  when performing CFA on self-report questionnaires. Therefore, two indices that depend on conventional cut-offs (Hu & Bentler, 1999) were also computed: the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). The combination of these two indices is valuable because the RMSEA is sensitive to the misspecification of the factor ‘loadings’ and the SRMR is sensitive to the misspecification of the factor ‘covariances’. An RMSEA of between 0 and 0.05 indicates a good fit and between 0.05 and 0.08 is considered an acceptable fit. An SRMR of between 0 and 0.05 indicates a good fit and between 0.05 and 0.10 represents an acceptable fit (Schermelleh-Engel & Moosbrugger, 2003). A CFA was then carried out on the 28 items of the DES utilizing maximum likelihood estimation with robust standard errors and a mean-adjusted Chi<sup>2</sup> statistic test (MLM, Muthén & Muthén, 2006). Of the 210 participants, one had two items of the DES with a missing value and was therefore excluded. Two latent variables were thus constructed according to the loadings of the items in the EFA. To define a model with two related dimensions of dissociative experiences, the two latent variables were allowed to correlate. The  $\chi^2$  statistic for the model was significant,  $\chi^2$  (349) = 595.773,  $p < .001$ . For the fit indices, we obtained a RMSEA = 0.058 and a SRMR = 0.066. The combination of the indices used indicated an acceptable fit. Internal consistency evaluated with Cronbach’s  $\alpha$  coefficient was equal to .87 for Factor 1 and .90 for Factor 2. The correlation observed between the two factors was large,  $r = .69$ ,  $CI = (.57, .78)$ . Scores for male and female participants were considered by computing Pearson’s point-biserial correlations, as in study 1. There were no gender differences for both Factor 1,  $r_{pb} = .11$ ,  $CI = (-.09, .29)$ , and Factor 2,  $r_{pb} = .02$ ,  $CI = (-.17, .21)$ .

Two alternative models were then computed. First, a model in which the 28 items of the DES were attributed to a unique latent factor representing dissociative experiences was computed. This was performed based on the fact that previous studies have argued for a single-factor model of the DES (Holtgraves & Stockdale, 1997; Wright & Loftus, 1999) and since a large correlation was observed

**Table 1**

Correlations between DES (total and sub-factor scores) and STAI-T, BDI-II, and IES-R.

	STAI	BDI-II	IES-R
DES – Total score	.19	.27**	.25*
DES – Factor 1 (defensive dissociations)	.20*	.25*	.27**
DES – Factor 2 (automatic pilot)	.15	.25*	.19

DES: Dissociative Experiences Scale; STAI: State-Trait Anxiety Inventory-Trait; BDI-II: Beck’s Depression Inventory II; IES-R: Impact of Event Scale-Revised.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

between the two factors of the first model that was computed. The  $\chi^2$  statistic for the model was significant,  $\chi^2$  (350) = 722.878,  $p < .001$ . We obtained a RMSEA = 0.071 and a SRMR = 0.072. Cronbach’s  $\alpha$  coefficient was .93. Second, we computed a model in which the 28 items of the DES were attributed to three latent factors, namely, Depersonalization and Derealization (items 1, 2, 3, 7, 12, 13, 14, 16, 19, 23, 28), Amnesic Fragmentation of identity (items 4, 5, 6, 8, 9, 10, 11, 21, 22, 26, 27), and Absorption and Imaginative involvement (items 15, 17, 18, 20, 24, 25). This model was tested according to the three-factor model proposed by Stockdale et al. (2002). The two latent variables were allowed to correlate. The  $\chi^2$  statistic for the model was significant,  $\chi^2$  (347) = 669.936,  $p < .001$ . We obtained a RMSEA = 0.067 and a SRMR = 0.071.

Although the indices computed advocated that the first two-factor model fits the data better than both a one-factor model and a three-factor model, we decided to compare the RMSEA of these nested models with software that provides point and interval estimates for RMSEA differences (FITMOD, Browne, 1992). This comparison showed that the two-factor model is not equal in efficiency and is not close to both the one- and the three-factor models, which reveal that the two-factor model fits the data better than the two alternative models tested.

In order to examine the concurrent validity of the French version of the DES, correlations (Pearson correlations with pair-wise treatment of missing values) were also computed between the DES and the STAI-T, BDI-II, and IES-R (Table 1). This revealed significant correlations between DES scores (including Total DES scores, and Factor 1 and Factor 2 DES scores) and the various questionnaires with the exception of the following correlations: DES Total and STAI-T; DES Factor 2 and STAI-T; DES Factor 2 and IES-R scores. Interestingly, only Factor 1 (and not Total DES scores and Factor 2 scores) correlated significantly with STAI-T scores, and Factor 1 (and not Factor 2) correlated with IES-R scores.

### 2.3. Discussion

The present study investigated the psychometric properties of the French adaptation (Darves-Bornoz et al., 1999) of the DES, which also incorporated the DES-C response form as recommended by Wright and Loftus (1999), in two independent samples of non-clinical participants. EFA (study 1) and CFA (study 2) showed that the French DES is best explained by a two-factor solution. Floor effects were avoided, as was high skewness of scores. Moreover, the internal reliability of the French DES was high. Finally, correlations were found with various measure of psychopathology (anxiety, depression, post-traumatic symptoms), indicating good concurrent validity. This is also in line with previous studies including non-clinical samples where dissociation has been associated with depression, anxiety and traumatic experiences (Holtgraves & Stockdale, 1997; Maaranen et al., 2005; Merckelbach & Muris, 2001; Merckelbach et al., 2002; Mulder et al., 1998; Seedat et al., 2003).

The 2-factor solution highlighted in the present study resembles the 2-factor solution reported in Waller et al. (1996) using taxometric methods. Based on a sample of 228 adults with

diagnosed multiple personality disorder and 228 normal controls, they identified a subset of DES items that the authors interpreted as being particularly good at differentiating people with pathological dissociation compared to those experiencing non-pathological dissociative experiences. Specifically, eight items<sup>4</sup> corresponded to the pathological dissociation type whereas the other 20 DES items reflected non-pathological dissociation. In the present study, all of the 8 items that loaded on the pathological factor in Waller et al. (1996) also loaded on the first factor in the present study. Thus, generally speaking and analogous to findings from Waller et al. (1996), items loading on Factor 1 may be considered to reflect pathological dissociation, whereas Factor 2 might represent items that are related to non-pathological dissociative states. Indeed, the three highest loading items on Factor 1 (item 5: “Finding new things among their belongings that they do not remember buying”; item 4: “Finding themselves dressed in clothes that they don’t remember putting on”; item 27: “Hearing voices inside their head that tell them to do things or comment on things that they are doing”) represent experiences associated with mental illness. Indeed, item 27 represents an experience (a so-called Schneiderian first-rank symptom) that is often reported by patients with chronic psychotic disorder such as schizophrenia. In contrast, the highest loading items for Factor 2 (item 2: “While listening to someone talk, suddenly realize that they did not hear part or all of what was just said”; item 24: “Cannot remember whether they have done something or have just thought about doing that thing”; item 20: “Sit staring off into space, thinking of nothing, and are not aware of the passage of time”) represent experiences related to absorption and imaginative involvement, and reality monitoring difficulties, all of which can often be experienced by individuals in the general population.

Although all eight of the pathological items (based on Waller et al., 1996) loaded on Factor 1, eight other items (e.g., items 4, 6, 9, 10, 11, 16, 26, 28) also loaded onto this factor, whereas in Waller et al. (1996) these items loaded onto the non-pathological factor. It is worth mentioning that many of these items had moderate loadings on the pathological factor. This was particularly the case for five of the eight items, namely, item 6 (0.54), item 9 (0.52), item 10 (0.39), item 16 (0.59), and item 26 (0.43). Indeed item 10 saturated onto both factors (Factor 1: 0.39; Factor 2: 0.30). Therefore, these items (i.e., items 6, 9, 10, 16 and 26) may be regarded as less representative of pathological dissociation. Concerning item 11 (“Looking in a mirror and not recognizing themselves”), it is worth mentioning that a highly similar item (“When looking at myself in a mirror, a window, a video or on a photo, I have sometimes not recognized myself, even though I did not confuse my face with someone else’s face”) taken from the Self-Face Recognition Questionnaire (Larøi, D’Argembeau, Brédart, & Van der Linden, 2007) was the least endorsed item in a study that included a large sample of non-clinical participants, and furthermore, that this item was highly (positively) correlated with a measure of schizotypy (Larøi et al., 2007). Thus, at least in non-clinical participants, item 11 may be considered as being closely related to problematic dissociation. Indeed, item 11 also loaded onto the Depersonalization/Derealization factor reported in Ross et al. (1991), which the authors considered a predictive factor for dissociative disorders. Similarly, Stockdale et al. (2002) found that item 11 loaded onto their Depersonalization factor, a factor which according to the authors is indicative of dissociative pathology. Concerning the remaining 2 items (items 4 and 28) that loaded onto the pathology factor in the present study, this is in line with Stockdale et al. (2002) who also found that item 4 loaded on their Amnesia factor and item 28 on their Depersonalization factor, which are both

considered as indicative of dissociative pathology. Items 4 and 28 also loaded on the Amnesic fragmentation of identity and Depersonalization/Derealization factors, respectively, in Darves-Bornoz et al. (1999).

Although some similarities exist between the factorial structure of the DES found in the present study and the taxonomic approach privileged by Waller et al. (1996), an in-depth analysis of the DES’s two factors remains necessary. Indeed, a distinction in terms of “pathological” (Factor 1) and “non-pathological” (Factor 2) dissociations might be too simplistic. More precisely, we propose that the two factors observed in the present study may be characterized as representing two forms of dissociation. In this perspective, Factor 1 comprises either dissociative amnesia episodes (items 3, 4, 5, 6, 8, 9, 10, 26), or depersonalization/derealization related dissociative experiences (items 7, 12, 13, 16, 22, 27, 28). In our view, these sorts of dissociative episodes may act as “defensive mechanisms”, especially in persons who have been traumatized (e.g., the avoidance of a memory related to a traumatic event) or who are prone to schizotypy-like experiences. Interestingly, the current study revealed a specific relation between Factor 1 of the DES and the IES-R, which reflects the impact of a stressful (and tentatively traumatic) event in daily life. Experiencing these types of dissociative episodes was also found to be associated with higher levels of depression and anxiety. In contrast, we think that Factor 2 of the DES relates to dissociative episodes associated with different types of “cognitive failures”. These cognitive failures often concern memory (items 15, 18, 24, 25) or attention (items 1, 2, 17). In support of this hypothesis, dissociative amnesia episodes comprised in Factor 1 of the DES concern entire amnesia with regard to an event (e.g., item 6: “No memory for important events in their lives”), whereas memory failures related to dissociative experiences of Factor 2 of the DES rather imply doubts about having done or not done something (e.g., item 24: “Cannot remember whether they have done something or have just thought about doing that thing”). We hypothesized that this kind of memory or attention failures are frequent in persons who often function in an “automatic pilot” mode (e.g., depressed people), which is further supported by the correlation between the BDI-II scores and this factor of the DES. It could also be possible that these types of dissociations are promoted by certain contexts in which effortful information processing is not required (e.g., item 2: “While listening to someone talk, suddenly realize that they did not hear part or all of what was just said”). It should be noted that Factor 2 also comprised several other dissociation related episodes which could not be considered as cognitive failures but that are very common experiences (e.g., lose control over time, talk out loud to themselves).

Results also revealed that the present form of the French adaptation of the DES possesses good psychometric properties. Floor effects were avoided. Indeed, the highest skewness value was 0.6, which is lower than the value (1.08) reported by Wright and Loftus (1999). Also, the overall DES score was essentially unskewed (average=0.1) and was similar to Wright and Loftus (1999), which reported –0.12. Regarding floor effects, the mean of the items ranged from 21% (item 4) to 57% (item 2). This is comparable with Wright and Loftus (1999) who showed similar means for the same items (14% and 53%, respectively).

The DES was shown to be highly reliable ( $\alpha=0.93$  across all items in study 1;  $\alpha=0.93$  across all items in study 2), which is similar to the mean  $\alpha$  reliability (0.93) reported in Van Ijzendoorn and Schuengel’s (1996) meta-analysis covering 16 DES studies. Furthermore, the two factors showed good reliability (Factor 1 = 0.93 and 0.87; Factor 2 = 0.85 and 0.90). Results from the current study also indicated good corrected item-to-total score correlations, which is consistent with previous studies (Bernstein & Putnam, 1986; Dubester & Braun, 1995).

<sup>4</sup> Items 3, 5, 7, 8, 12, 13, 22 and 27.

A few limitations deserve mentioning. Although several psychometric properties of the DES were evaluated in the present study, its test-retest reliability was not. Also, it would be valuable to carry out a similar study albeit including clinical participants who experience dissociation.

In conclusion, this study offers evidence that the present version of the French adaptation of the DES shows good psychometric properties. Finally, EFA and CFA revealed that a 2-factor solution best fit the data, and that these two factors seem to reflect “automatic pilot” related dissociation episodes (Factor 2) and “defensive” dissociation episodes (Factor 1). Thus, it may be fruitful to calculate both the DES total score, in addition to scores on the two factors as these will provide an indication of how individuals score on the two types of dissociative experiences.

### Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

### Acknowledgements

This research was supported by a Joined Research Grant (ARC 06/11-337) from the Belgian French Community.

### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.erap.2013.04.004>.

### References

- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (Fourth edition, pp. ). Washington D.C.: American Psychiatric Press.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manuel: Inventaire de Dépression de Beck* (Second edition, pp. ). Paris: Éditions du Centre de Psychologie Appliquée.
- Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease*, *174*, 727–735.
- Browne, M.W. (1992). FITMOD: Point and interval estimates of measures of fit of a model. [Computer software].
- Bruchon-Schweitzer, M. L., & Paulhan, I. (1993). *Manuel de l'inventaire d'anxiété état-trait forme Y (STAI-Y)*. Paris: Éditions du Centre de Psychologie Appliquée.
- Brunet, A., St Hilaire, A., Jehel, L., & King, S. (2003). Validation of a French version of the Impact of Event Scale-Revised. *Canadian Journal of Psychiatry*, *48*, 56–61.
- Byrne, B. M. (1994). *Structural Equation modelling with EQS and EQS/Windows: basic concepts, applications, and programming*. Thousand Oaks, CA: Sage.
- Darves-Bornoz, J. M., Degiovanni, A., & Gaillard, P. (1999). Validation of a French version of the dissociative scale in a rape-victim population. *Canadian Journal of Psychiatry*, *44*, 271–275.
- Dubester, K. Z., & Braun, B. G. (1995). Psychometric properties of the dissociative experiences scale. *Journal of Nervous and Mental Disease*, *183*, 231–235.
- Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, *4*, 272–299.
- Fischer, D. G., & Elnitsky, S. (1990). A factor analytic study of two scales measuring dissociation. *Journal of Clinical Hypnosis*, *32*, 201–207.
- Frischholz, E. J., Braun, B. G., Sachs, R. G., Hopkins, L., Shaeffer, D. M., Lewis, J., et al. (1990). The Dissociative Experiences Scale: further replication and validation. *Dissociation*, *3*, 151–153.
- Foote, B., Smolin, Y., Kaplan, M., Legatt, M. E., & Lipschitz, D. (2006). Prevalence of dissociative disorders in psychiatric outpatients. *American Journal of Psychiatry*, *163*, 623–629.
- Holmes, E. A., Brown, R. J., Mansell, W., Fearon, R. P., Hunter, E. C. M., Frasquilho, F., et al. (2005). Are there two qualitatively distinct forms of dissociation? A review and some clinical implications. *Clinical Psychology Review*, *25*, 1–23.
- Holtgraves, T., & Stockdale, G. (1997). The assessment of dissociative experiences in a non-clinical population: reliability, validity, and factor structure of the Dissociative Experiences Scale. *Personality and Individual Differences*, *22*, 699–706.
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.
- Larøi, F., D'Argembeau, A., Brédart, S., & Van der Linden, M. (2007). Recognition failures in schizotypy. *Cognitive Neuropsychiatry*, *12*, 554–571.
- Maaranen, P., Tanskanen, A., Honkalampi, K., Haatainen, K., Hintikka, J., & Viinamäki, H. (2005). Factors associated with pathological dissociation in the general population. *Australian and New Zealand Journal of Psychiatry*, *39*, 387–394.
- Merckelbach, H., & Muris, P. (2001). The causal link between self-reported trauma and dissociation: a critical review. *Behavioral Research and Therapy*, *39*, 245–254.
- Merckelbach, H., Horselenberg, R., & Schmidt, H. (2002). Modeling the connection between self-reported trauma and dissociation in a student sample. *Personality and Individual Differences*, *32*, 695–705.
- Mulder, R. T., Beautrais, A. L., Joyce, P. R., & Fergusson, D. M. (1998). Relationship between dissociation, childhood sexual abuse, childhood physical abuse, and mental illness in a general population sample. *American Journal of Psychiatry*, *155*, 806–811.
- Muthén, L. K., & Muthén, B. O. (2006). *Mplus user's guide* (Fourth edition, pp. ). Los Angeles: Muthén & Muthén.
- Putnam, F. W., Carlson, E. B., Ross, C. A., Anderson, G., Clark, P., Torem, M., et al. (1996). Patterns of dissociation in clinical and non-clinical samples. *Journal of Nervous and Mental Disease*, *184*, 673–679.
- Ray, W. J., & Faith, M. (1995). Dissociative experiences in a college age population: follow-up with 1190 subjects. *Personality and Individual Differences*, *18*, 223–230.
- Ray, W. J., June, K., Turaj, K., & Lundy, R. (1992). Dissociative experiences in a college age population: a factor analytic study of two dissociation scales. *Personality and Individual Differences*, *13*, 417–424.
- Ross, C. A. (1997). *Dissociative identity disorder: diagnosis, clinical features and treatment of multiple personality* (Second edition, pp. ). New York: Wiley.
- Ross, C. A., Joshi, S., & Currie, R. (1991). Dissociative experiences in the general population: a factor analysis. *Hospital and Community Psychiatry*, *42*, 297–301.
- Sanders, B., & Green, J. A. (1994). The factor structure of the Dissociative Experiences Scale in college students. *Dissociation*, *7*, 23–27.
- Sar, V., Koyuncu, A., Ozturk, E., Yargic, L. I., Kundakci, T., Yazici, A., et al. (2007). Dissociative disorders in the psychiatric emergency ward. *General Hospital Psychiatry*, *29*, 45–50.
- Schermelleh-Engel, K., & Moosbrugger, H. (2003). Evaluating the fit of structural equation models: test of significance and descriptive goodness of fit measures. *Methods of Psychological Research Online*, *8*, 23–74.
- Seedat, S., Stein, M. B., & Forde, D. R. (2003). Prevalence of dissociative experiences in a community sample. *Journal of Nervous and Mental Disease*, *191*, 115–120.
- Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory STAI (Form Y): self-evaluation questionnaire*. Palo Alto: Consulting Psychologists Press.
- Stockdale, G. D., Gridley, B. E., Balogh, D. W., & Holtgraves, T. (2002). Confirmatory Factor Analysis of single- and multiple-factor competing models of the dissociative experiences scale in a non-clinical sample. *Assessment*, *9*, 94–106.
- Van Ijzendoorn, M. H., & Schuengel, C. (1996). The measurement of dissociation in normal and clinical populations: meta-analytic validation of the dissociative experiences scale (DES). *Clinical Psychology Review*, *16*, 365–382.
- Velicer, W. F. (1976). Determining the number of components from the matrix of partial correlations. *Psychometrika*, *41*, 321–327.
- Waller, N. G., & Ross, C. A. (1997). The prevalence and biometric structure of pathological dissociation in the general population: taxometric and behavior genetic findings. *Journal of Abnormal Psychology*, *106*, 499–510.
- Waller, N. G., Putnam, F. W., & Carlson, E. B. (1996). Types of dissociative types: a taxometric analysis of dissociative experiences. *Psychological Methods*, *1*, 300–321.
- Weiss, D. S., & Marmar, C. R. (1997). The Impact Event Scale-Revised. In J. P. Wilson, & T. M. Keane (Eds.), *Assessing trauma and PTSD* (pp. 399–411). New York: Guilford Press.
- Wright, D. B., & Loftus, E. F. (1999). Measuring dissociation: comparison of alternative forms of the dissociative experiences scale. *American Journal of Psychology*, *112*, 497–512.