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Factor Structure of the Dissociative Experiences Scale: An Examination Across Sexual Assault Status

Shira A. Olsen · Joshua D. Clapp · Gilbert R. Parra · J. Gayle Beck

Abstract The Dissociative Experiences Scale (DES) has a long history within the literature, with conflicting reports concerning its underlying components and stability across different samples. This study examined the DES factor structure using advanced analytic procedures. Additionally, the impact of sexual victimization on the underlying components of the DES was explored, in order to examine whether sexual trauma influenced the scale's structure. In Study 1, exploratory factor analysis suggested the possibility of either a 1- or 2-factor structure in DES data obtained from an unselected sample of college females. Comparison of these models using an independent validation sample in Study 2 observed a clear advantage of a 2-factor structure. Study 3 explored whether sexual assault status influenced the structure of the 2-factor DES model, using samples drawn from Studies 1 and 2. A multiple group confirmatory factor analysis supported a robust 2-factor structure for the DES irrespective of sexual assault status.

Keywords Dissociative experiences scale · Factor structure · Dissociation · Sexual assault

S. A. Olsen (✉)
Department of Psychiatry and Behavioral Sciences,
University of Washington School of Medicine,
Box 356560, 1959 N.E. Pacific St,
Seattle, WA 98195-6560, USA
e-mail: solsen3@uw.edu

J. D. Clapp
Department of Psychology, University of Wyoming,
Dept. 3415 1000 E. University Ave,
Laramie, WY 82071, USA

G. R. Parra
Department of Psychology, University of Southern
Mississippi, Owings-McQuagge Hall (OMH),
231 118 College Drive, #5025,
Hattiesburg, MS 39406, USA

J. G. Beck
Department of Psychology, University of Memphis,
400 Innovation Drive 202 Psychology Building,
Memphis, TN 38152, USA

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Dissociative phenomena have steadily gained attention across multiple areas of the psychological literature. Although conceptualizations of the construct vary, researchers agree that dissociation involves a disruption of the successful integration of thoughts, memories, and emotions into conscious awareness (DePrince and Freyd 2007). Janet, the first author to introduce the term dissociation, described the construct as pathological in nature, involving alterations in consciousness that prevent potentially traumatic information from entering into awareness (DePrince and Freyd 2007). Although some continue to conceptualize dissociative states as maladaptive responses to threatening material (e.g., Frankel 1990; Waller et al. 1996), a more common view is that dissociative tendencies vary from normal experience (e.g., day dreaming) to severe pathology (e.g., Dissociative Identity Disorder). Within this framework, dissociative tendencies are viewed as both natural and distinguishable based on their severity (Price 1987; Spiegel 1963).

One of the instruments used most extensively to quantify the frequency and severity of dissociative experience is the Dissociative Experiences Scale (DES; Bernstein and Putnam 1986). The DES contains 28 items assessing a range of dissociative experiences along a continuous scale. For each item, respondents provide a continuous percentage rating (0 %–100 %) indicating the frequency of each dissociative experience. Evidence of both test–retest reliability (0.78 to 0.84; Carlson and Putnam 1993) and internal

consistency (0.83 to 0.93; Bernstein and Putnam 1986) have been reported for the DES. Although this measure was developed as a screening instrument for dissociative disorders, numerous studies have used the DES to assess dissociative experiences across both clinical and community samples (see van Ijzendoorn and Schuengel 1996). Research using the DES has found that both clinical and nonclinical samples report similar types of dissociative experiences (Putnam et al. 1996), suggesting that the DES may serve a variety of clinical and research purposes.

Despite its widespread use, several limitations of the measure have emerged, including considerable variability in the factor structure of the DES. In the scale's original development, Bernstein and Putnam (1986) reported three subcomponents of dissociation using both clinical and convenience samples: absorption (e.g., being absorbed in a movie), depersonalization/derealization (e.g., not recognizing oneself in a mirror), and amnesia (e.g., not recognizing friends or family). Although other investigators report evidence supporting a 3-factor structure, items contained on each specific dimension have varied across studies and samples (e.g., Carlson et al. 1991; Ross et al. 1991, 1995; Sanders and Green 1994; Schwartz et al. 1991; Stockdale et al. 2002). Adding to the complexly of the underlying structure of the DES, other investigators have reported 4-factor models containing subcomponents of dissociative amnesia (e.g., Dunn et al. 1994; Ray and Faith 1995) and 1-factor models representing a common dimension of dissociation (Fischer and Elnitsky 1990; Holtgraves and Stockdale 1997).

A number of conceptual and methodological issues further complicate interpretation of the DES literature. First, decisions regarding the selection and retention of specific items are frequently inconsistent and conceptually unclear. Although the majority of studies discard items in an effort to obtain a parsimonious fit, it is common to see several items that crossload on two or more factors, while other items may fail to load on the most logical, conceptual factor (e.g., amnesia item loading on the absorption factor). Second, previous studies have not adequately addressed the skewed frequency distribution of DES items, which is a result of the scarcity of severe dissociative experiences in community samples. Failing to account for a non-normal distribution violates principle assumptions of some forms of factor analysis, and may help to explain the various DES structural models identified across the literature. Third, the statistical procedures implemented across studies potentially contribute to the plethora of mixed results in that research has focused primarily on exploratory analyses, with less emphasis on confirmatory analyses. Although notable exceptions exist, (e.g., Ruiz et al. 2008; Stockdale et al. 2002), studies have rarely implemented both types of statistical procedures when evaluating the DES factor structure. Finally, studies often neglect to test the stability of their structural model across an independent comparison sample, an important step when considering the validity of a factorial model. The statistical choices implemented across studies may play a role in the discrepant findings within this literature. As such, additional research on the factor structure of the DES is needed, using published guidelines for selection and retention of items, management of items that cross-load on multiple factors, data skew, and incorporation of both exploratory and confirmatory analytic approaches.

Variability in the characteristics of samples used to examine underlying dimensions of the DES may also have an influence on the reported structure. Despite the role of traumatic events in many conceptualizations of dissociation (e.g., DePrince and Freyd 2007), few studies have assessed the impact of trauma exposure on the structure of dissociative phenomenon. One study conducted by Ruiz and colleagues (2008) examined the DES factor structure within a trauma reporting sample of criminal offenders (N=1,515). A 3-factor solution was extracted; however, this model was not stable under confirmatory analysis. Although, significant correlations were observed between self-reported child sexual trauma and dissociation, this study did not assess whether the obtained DES factor structure was similar in individuals reporting childhood sexual abuse versus those without this history (Ruiz et al. 2008). A second study conducted by Amdur and Liberzon (1996) examined the DES factor structure among combat veterans with PTSD (N=129). These authors identified a 4-factor model, which is inconsistent with the 3-factor structures found in other clinical populations (Carlson et al. 1991; Ross et al. 1995; Schwartz et al. 1991). Although a 4-factor solution had been identified previously within a clinical sample (e.g., Dunn et al. 1994), individual items underlying each factor are not consistent across the two studies. Thus, the DES factor structure has been inconsistent across different trauma reporting samples. Further, it is unclear whether the factor structure of the DES is consistent across individuals with and without exposure to an extreme event.

To date, there is little consensus within the literature regarding the factor structure of the DES. It is unclear whether the underlying components of the scale consistently measure the same unique factors of dissociative experiences. Moreover, it is unclear if similar factor structures exist across individuals with and without exposure to an extreme event. The present research aimed to examine the factor structure of the DES across a series of three studies. Study 1 explored the structure of the DES using exploratory factor analyses (EFA). Study 2 examined the validity of solutions isolated in Study 1 using confirmatory factor analyses (CFA) in an independent validation sample. Finally, Study 3 examined the stability of the DES structure across subsamples of individuals reporting a history of sexual assault or no such history, using aggregate data from Studies 1 and

2. This sample was selected due to previous research suggesting a link between trauma and dissociative experiences that is particularly robust for victims of sexual assault (Coons and Milstein 1986; Sandberg and Lynn 1992). Further, studies have shown that women with a history of sexual victimization report higher levels of dissociation compared to females without such history (Briere and Runtz 1993). Comparison of sexual assault and non-assault groups served as an initial examination of the influence that an extreme event may have on the DES factor structure. Specifically, these analyses were intended to identify possible discrepancies in the underlying structure of the DES based on assault status, and to determine whether the factor structure is consistent across different groups.

Study 1: Exploratory Factor Analysis

Participants

Five hundred seventy-five females recruited from introductory psychology courses participated in the study. Participants provided informed consent and received experimental credit for participation. Complete data were obtained from approximately 94 % (N=540) of the initial sample. Incomplete responders were comparable to participants included in the final sample with respect to age, ethnicity, and year in college after correction for multiple comparisons ($alpha \leq .017$; all p-values$\geq$.151). Characteristics of the final sample are summarized in Table 1.

Measures

Dissociative Experiences Scale (DES; Bernstein and Putnam 1986). The DES contains 28 items that encompass a range of dissociative experiences. As discussed, this measure demonstrates adequate reliability and internal validity.

Analytic Approach

Examination of DES factor structure was conducted using PASW 17.0. Given limitations of classic approaches to determining the number of factors for extraction (i.e., eigenvalues>1.0; Kaiser 1960), decisions regarding the retention of factors were guided by conceptual considerations and Horn's (1965) parallel analysis. Based on guidelines for interpretation of factor loadings (Comrey and Lee 1992), indicators with loadings$\geq$.45 (i.e., fair) on a single factor and <.32 (i.e., poor) on any other factor were considered for retention. These criteria were used as a conservative attempt to reduce ambiguity surrounding items with marginal or complex loadings.

Results

Item distributions and covariances were examined prior to analysis to determine factorability. Although estimation methods used in EFA are free of distributional assumptions, DES items evidenced considerable violations of univariate and multivariate normality (skew=0.68 to 6.75; kurtosis=−0.51 to 56.76; Malhalanobis distance=1.57 to 213.39). Both the Kaiser–Meyer–Olkin Index of Sampling Adequacy (KMO=.94) and Bartlett's Test of Sphericity ($\chi^2(378)=7562.94$; $p<.001$) indicated the correlation matrix of these data was suitable for factor analysis.

Parallel analysis suggested a possible 2-factor solution to these data. Extraction of two factors using principal axis factoring with Varimax rotation accounted for 41.92 % of the variance in the reduced correlation matrix.[1] Communalities (i.e., percentage of indicator variance accounted for by the solution) ranged from .23 to .57. Ten items (2, 10, 14, 15, 17, 19, 20, 21, 23, 24) were observed to load significantly and uniquely on the initial factor. Nine items (3, 4, 7, 8, 11, 12, 13, 27, 28) were observed to load significantly and uniquely on the second factor. Remaining items were eliminated given complex loadings (items 16, 18, 22, 25, & 26) or non-salient loadings on either factor (items 1, 5, 6, & 9).

Parallel analysis also suggested a possible 1-factor structure to these data. Extraction of a single factor with principal axis factoring accounted for 37.36 % of the variance in the reduced correlation matrix. Communalities in this solution ranged from .22 to .54.

Discussion—Study 1

Results of Study 1 suggest two plausible factor structures. One solution contained all 28 DES items, indicating a single factor to the scale. This 1-factor model is consistent with several studies exploring the structure of the DES in non-clinical samples (Fischer and Elnitsky 1990; Holtgraves and Stockdale 1997). Alternatively, a possible 2-factor structure emerged. Although this study is the first to suggest a 2-factor solution, items contained on each factor have been reported to covary in previous research (e.g., Carlson et al. 1991; Dunn et al. 1994; Ross et al. 1995; Stockdale et al. 2002). Specifically, indicators contained on the first factor are consistent with dimensions previously conceptualized as absorption or imaginative involvement. The second factor contains items conceptualized as indicative of depersonalization, derealization, and amnesia.

Selection among these two solutions based on these exploratory analyses is difficult given the relative strengths and weaknesses of each. The single factor model is more

[1] Oblique rotation (i.e., Promax) of the 2-factor solution returned functionally identical results.

Table 1 Demographic information for three samples

	EFA	CFA	Groups		
	Study 1	Study 2	Non-assault	Assault	Total
N	540	435	695	199	894
Age	21.2 (5.9)	20.0 (3.6)	20.1 (4.1)	21.2 (5.7)	20.4 (4.6)
Race/ethnicity					
Caucasian	52.0 %	51.3 %	52.4 %	48.2 %	51.5 %
African American	38.1 %	39.5 %	38.4 %	42.2 %	39.3 %
Hispanic	1.3 %	2.1 %	1.4 %	2.0 %	1.6 %
Asian	2.2 %	1.6 %	2.4 %	0.5 %	2.0 %
Bi-racial	3.5 %	3.9 %	3.2 %	6.0 %	3.8 %
Other	1.9 %	1.1 %	1.6 %	1.0 %	1.5 %

Percentages may not total to 100 % given incomplete responding

EFA exploratory factor analysis, Study 1; *CFA* confirmatory factor analysis, Study 2; *Groups* group CFA using combined Study 1 and Study 2 samples

parsimonious and retains all items included on the original scale. Although the 1-factor solution has been identified in previous studies (Fischer and Elnitsky 1990; Holtgraves and Stockdale 1997), it is inconsistent with the majority of research demonstrating a multiple factor structure to the DES (e.g., Carlson et al. 1991; Dunn et al. 1994; Ross et al. 1995). The 2-factor model, by contrast, may more finely extract distinct dimensions of dissociation but results in the loss of approximately 1/3 of items from the original scale. The objective of Study 2 was to examine the fit of each solution using confirmatory factor analyses within a separate sample.

Study 2: Confirmatory Factor Analysis

Participants

A separate sample of 459 female undergraduates was recruited. As before, students provided informed consent and received credit for participation. Complete data were obtained from approximately 89 % (N=435) of the initial sample. Incomplete responders were comparable to the final sample on age, ethnicity, and year in college after correction for multiple comparisons ($alpha \leq .017$; all p-values$\geq .027$; see Table 1).

Analytic Approach

Two confirmatory factor models were examined given the results of Study 1. The first was a 1-factor model containing all 28 DES indicators loading on a single dissociation factor. The second was the 2-factor model containing both Absorption (ABS) and Depersonalization/Derealization/Amnesia (DDA) factors identified in Study 1. Latent factors in this model were allowed to covary. Measurement errors were specified as uncorrelated in both models.

Confirmatory analyses were conducted using MPlus 3.13. Whereas EFA makes no assumptions regarding the underlying distribution of the data, maximum likelihood (ML) estimation techniques commonly used in CFA assume multivariate normality. Use of conventional ML estimation methods under conditions of non-normality have been shown to result in an inflated chi-square statistic, a bias contributing to the appearance of poor fit (Curran et al. 1996). Given evidence of severe normality violations among continuous DES indicators, CFA of the specified 1- and 2-factor models utilized a Satorra–Bentler corrected chi-square statistic, which adjusts the chi-square through inclusion of a correction factor influenced by the degree of non-normality in the sample data (Santorra and Bentler 1994). Indices of model fit included the root-mean-square of approximation (RMSEA), standardized root-mean-square residual (SRMR), comparative fit index (CFI), and Tucker-Lewis index (TLI). RMSEA values less than .08, SRMR values less than .10, and CFI and TLI values greater than .90 were considered as criterion for adequate model fit (Bentler 1990; Brown and Cudeck 1993; Kline 2005). RMSEA less than .06, SRMR less than .08, and CFI and TLI greater than .95 were used to designate close fit (Hu and Bentler 1999). Three additional indicators, the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Adjusted Bayesian Information Criterion (aBIC), also were used to compare the relative fit of the 1- and 2-factor models. Although these indicators do not have an absolute value associated with closeness of fit, AIC, BIC, and aBIC can be used to compare non-nested models where the model evidencing the lowest value is preferred.

Results

1-Factor Model

Indices associated with the 1-factor structure ($\chi 2(350)=963.47$; $p<.001$; AIC=103707.85; BIC=104050.18; aBIC=103783.61) indicate a poor fit. Although the

RMSEA (.06) suggested the possibility of an adequate model, CFI (.81) and TLI (.80) were far below conventional criteria for acceptable fit.[2] Given that all indicators demonstrated substantial loadings on the common factor (λ=.47 to .76), modification indices were examined to determine areas of localized strain. A total of 37 error covariances were recommended for inclusion; however, expected improvement associated with the inclusion of any specific covariance was modest. As such, no attempt at post-hoc respecification was attempted with the 1-factor model.

2-Factor Model

Examination of the 2-factor structure suggested an adequate fit to the sample data ($\chi^2(151)=307.76$; $p<.001$; CFI=.92; TLI=.91; RMSEA=.05). All indicators demonstrated substantial loadings on their respective factors (ABS λ=.54 to .76; DDA λ=.66 to .81). Latent ABS and DDA factors were strongly correlated in this model (r=.71). AIC (69899.47), BIC (70135.84), and aBIC (69951.78) values also demonstrate the superiority of the 2-factor model relative to the single factor solution. Modification indices revealed minor improvements associated with the inclusion of three error covariances; however, no post-hoc modifications were made to improve overall model fit. Factor loadings, standard errors, and R^2 values for the final 2-factor model are provided in Table 2.

Discussion—Study 2

Results of Study 2 provide support for the 2-factor DES model. Despite the plausibility of the 1-factor model within Study 1, CFA suggested the necessity of extracting two related, but distinct, dimensions of dissociation in these data. The purpose of Study 3 was to examine the stability of the 2-factor structure across women with and without a history of sexual assault in order to determine whether exposure to sexual trauma alters the structure of the DES.

Study 3: Group CFA

Participants

Aggregate data from Study 1 and 2 were utilized for group CFA. Of the 975 available participants, approximately 92 % (N=894) provided useable data pertaining to the presence (n=199; 22 %) or absence of sexual assault history. Comparison of complete and incomplete responders revealed no differences in ethnicity; however, individuals failing to provide complete data regarding sexual assault history were significantly older ($p<.001$) and were overrepresented by women in their third and fourth year of college ($\chi^2(4)=93.77$; $p<.001$; see Table 1).

Measures

Sexual Experiences Survey (SES; Koss and Oros 1982). The SES is a 13-item scale that assesses the occurrence of sexual experiences ranging from consensual intercourse to forcible rape. Example items include "Have you ever had sexual intercourse with a man when you didn't want to because he used some degree of physical force (twisting your arm, holding you down, etc.)?" "Have you ever been raped?" For the current study, sexual assault was conceptualized as sexual contact coerced through physical force or the threat of physical force (i.e., items 7–13). Koss and Gidycz (1985) document adequate psychometrics of the SES.

Analytic Approach

Comparison of factor structure across assault and non-assault groups in this study borrows heavily from procedures recommended by Brown (2006) and Byrne et al. (1989). First, the 2-factor DES model was examined individually in both assault and non-assault groups. These models are used to ensure that the 2-factor model is generally acceptable in each group. Next, the 2-factor model was examined simultaneously across both assault and non-assault groups (Equal Form). This is the least restrictive model (e.g., all parameters are estimated freely across groups), and the resulting model chi-square serves as a reference point for subsequent models. Next, a model was examined in which factor loadings were held to be equal across groups (Equal Factor Loadings). Comparison with the Equal Form model determines whether indicators hold the same relationship with the underlying factors in both assault and non-assault groups. Finally, a model was examined wherein the intercept of each indicator (i.e., the predicted mean of the individual item) was held to be equal across groups (Equal Intercepts). Comparison with the Equal Factor Loadings model is used to determine whether the predicted score for each item is the same across groups at a given level of the latent factor, known as "strong factorial invariance" (Brown 2006). Evidence of strong factorial invariance suggests that for any given value of the underlying ABS and DDA factors, observed values for all indicators are expected to be equal across assault and non-assault groups.

[2] The augmented variance–covariance matrix complete with indicator means used in these analyses is available from the second author upon request.

Table 2 Factor loadings, standard errors, and R^2 values for the 2-factor DES model

Scale items	Loading	Std. error	Std. loading	R^2
Absorption				
2. Missing part of a conversation	1.00	0.00	0.59	0.35
10. Being accused of lying when telling the truth	0.87	0.09	0.60	0.36
14. Remembering the past so vividly one seems to be reliving it	1.13	0.11	0.63	0.40
15. Not sure if remembered event happened or was a dream	1.28	0.11	0.76	0.58
17. Absorption in television program	1.28	0.12	0.70	0.49
19. Able to ignore pain	0.96	0.12	0.55	0.30
20. Staring into space	1.37	0.12	0.74	0.54
21. Talking out loud to oneself	1.07	0.12	0.54	0.29
23. Usually difficult things can be done with ease and spontaneity	1.20	0.11	0.65	0.42
24. Not sure whether one has done something or only thought about it	1.36	0.12	0.73	0.54
Amnesia/depersonalization				
3. Finding oneself in a place but unaware of how one got there	1.00	0.00	0.66	0.44
4. Finding oneself dressed in clothes one doesn't remember putting on	0.64	0.11	0.75	0.56
7. Seeing oneself as if looking at another person	1.18	0.13	0.71	0.50
8. Not recognizing friends or family	0.88	0.12	0.67	0.44
11. Not recognizing one's reflection in a mirror	0.97	0.14	0.75	0.56
12. Other people and objects do not seem real	1.19	0.13	0.76	0.58
13. Feeling as though one's body is not one's own	1.04	0.09	0.76	0.57
27. Hearing voices inside one's head	1.09	0.12	0.67	0.45
28. Looking at the world through a fog	1.12	0.11	0.81	0.66

Correlation between latent Absorption and Amnesia/Depersonalization factors=0.71. (Factor covariance=120.17)

Results

Sample Characteristics

Based on responses to the SES, 199 women included in Studies 1 and 2 reported at least one experience consistent with sexual assault. Examination of groups indicate modest, but significant, difference in age across assault and non-assault groups (p=.012; see Table 1). No differences were observed with respect to ethnicity or year in college (p-values≥.135).

Individual Groups Analysis

Independent analysis of the 2-factor structure in assault and non-assault samples provided no evidence of gross missfit. Fit indices for non-assault ($\chi^2(151)=414.16$; $p<.001$; CFI=.90; TLI=.89; RMSEA=.05) and assault groups ($\chi^2(151)=228.71$; $p<.001$; CFI=.89; TLI=.87; RMSEA=.05) were generally comparable to values observed in Study 2. Parameter estimates and modification indices evidenced no areas of marked strain in either analysis.

Equal Form Analysis

Simultaneous analysis of the equal form provides a comparison for subsequent models (see Table 3). Given that the Satorra–Bentler adjusted chi-square requires estimation of mean structures, latent factor means were constrained to 0 in order to achieve identification. The resulting model was overidentified with 302 *df*. All factor loadings, error variances, indicator intercepts, factor variances, and factor covariances were freely estimated across assault and non-assault groups ($\chi^2(302)=666.80$; $p<.001$; CFI=.90; TLI=.89; RMSEA=.05).

Equal Factor Loading Analysis

Next, a more restrictive model was estimated in which factor loadings were forced to remain equal across groups. Factor means were constrained to 0 in order to achieve identification. All other parameters were estimated freely ($\chi^2(319)=685.45$; $p<.001$; CFI=.90; TLI=.89; RMSEA=.05). Comparison of the Equal Factor Loading model with the less restrictive Equal Form model evidenced no significant increase in model chi-square ($\chi^2\Delta(17)=23.78$; p=.126; see Table 3) when compared using the corrected difference statistic specified by Satorra and Bentler (1999). These data suggest that all indicators on the 19-item scale hold the same relationship with underlying ABS and DDA factors irrespective of assault status.

Table 3 Invariance analyses exploring equivalence of structure, factor loadings, and indicator intercepts across sexual assault (n=199) and non-assault (n=695) groups

Model	sb X^2 (*df*)	scf	sb $X^2\Delta$ (*df*)[a]	Comparison Model
1. Equal Form	666.80 (302)	1.91	–	–
2. Equal Factor Loadings	685.45 (319)	1.95	23.78 (17)	1
3. Equal Intercepts	727.66 (338)	1.90	40.14 (19)***	2
4. Equal Intercepts—ABS	705.57 (329)	1.92	18.85 (10)*	2
4a. Equal Intercepts—ABS 2[b]	700.65 (328)	1.93	11.40 (9)	2
5. Equal Intercepts—DDA	722.55 (337)	1.90	24.37 (9)**	4a
5a. Equal Intercepts—DDA 2[c]	715.26 (336)	1.90	12.39 (8)	4a

SB X^2 Satorra–Bentler scaled Chi-square statistic; *scf* scaling correction factor associated with the sb X^2 ; *ABS* absorption; *DDA* Depersonalization/Derealization/Amnesia

[a] Comparisons of nested models utilized a corrected Chi-square difference statistic as specified by Satorra and Bentler (1999)

[b] Model 4a constrains intercepts of Absorption indicators to equality with the exception of DES 19

[c] Model 5a constrains intercepts of Absorption and Amnesia/Depersonalization indicators to equality with the exception of DES 19 & DES 11; fit indices for partially invariant model (5a) are CFI=0.90; TLI=0.90; RMSEA=0.05; SRMR=0.06

*$p\leq.05$; **$p\leq.01$; ***$p\leq.001$

Equal Intercept Analysis

Finally, the most restricted model in these analyses was tested wherein all factor loadings and indicator intercepts were held equal across groups. Factor means also were constrained to 0 ($\chi^2(319)=727.65$; $p<.001$; CFI=.89; TLI=.89; RMSEA=.05). Comparison with the less restrictive Equal Factor Loading model evidenced a significant increase in model chi-square ($\chi^2\Delta(19)=40.14$; $p=.003$; see Table 3). These data indicate at least one intercept in the 2-factor model varies across assault and non-assault groups. In other words, assault and non-assault groups can be expected, on average, to report different scores on at least one item given a similar level of underlying ABS and/or DDA. A series of stepwise analyses were conducted to isolate invariant parameters (Byrne et al. 1989).

Equal Intercepts—Absorption

First, a model was estimated in which intercepts for all ten ABS items were constrained to equality (Equal Intercepts—ABS; see Table 3). An increase in model chi-square ($\chi^2\Delta(10)=18.85$; $p=.042$) was observed relative to the Equal Factor Loading model, indicating at least one intercept differed across assault and non-assault groups. As such, a series of models were examined wherein individual intercepts were constrained to equality successively to identify specific invariant parameters. Constraints on intercepts for items 2, 10, 14, 15, and 17 all returned non-significant increases in model chi-square relative to the Equal Factor Loading model ($p\geq.203$). Constraint on item 19 (e.g., able to ignore pain), by contrast, returned a significant increase in the model chi-square ($\chi^2\Delta(6)=14.93$; $p=.021$). Item 19 was allowed to be estimated freely in successive models. No further evidence of invariance was noted in the remaining ABS items ($p\geq.157$). The final model with nine of the ten ABS intercepts constrained to equality resulted in a non-significant chi-square increase relative to the original Equal Factor Loading model (Equal Intercepts—ABS 2; $\chi^2\Delta(9)=11.40$; $p=.249$; see Table 3). Intercepts for item 19 in this model indicate larger intercepts among assault (27.12) relative to non-assault (21.724) groups. That is, given the same level of underlying ABS, assault groups may be expected to report higher scores for item 19 than non-assault groups.

Equal Intercepts—Depersonalization/Derealization/Amnesia

Intercept invariance for the DDA factor was examined using the Equal Intercepts—ABS 2 model as a reference. An initial model (Equal Intercepts—DDA) constraining ABS intercepts (with the exception of item 19), and all nine DDA intercepts resulted in a significant increase in the overall chi-square ($\chi^2\Delta(9)=24.37$; $p=.004$; see Table 3). Successive constraints on intercepts for items 3, 4, 7, and 8 resulted in non-significant increases in model chi-square ($p\geq.364$). Constraint on item 11 (e.g., not recognizing one's reflection in a mirror), by contrast, resulted in a significant increase in model chi square ($\chi^2\Delta(5)=18.05$; $p=.003$). Upon freeing intercepts for item 11, no further evidence of invariance was noted in the remaining DDA items ($p\geq.135$). Estimates provided by the final model suggest significantly larger intercepts for item 11 among non-assault (4.07) relative to assault (1.97) groups. That is, given the same level of underlying DDA, non-assault groups may be expected to report higher scores for item

11 than assault groups. The final model (Equal Intercepts DDA 2) containing equal factor loadings and equal intercepts—excluding items 11 and 19—provided an adequate fit to the sample data ($\chi^2(336)=715.26$; $p<.001$; CFI=.90; TLI=.90; RMSEA=.05).

Discussion

Results of Study 3 provide support for the validity of the 2-factor structure across assault and non-assault groups. Specifically, these data suggest all 19 items hold the same relationship with the underlying factors irrespective of assault status. Furthermore, standards for strict factorial invariance were approximated suggesting that given the same level of underlying ABS and DDA, assault and non-assault groups are expected to report comparable scores on individual items. Exceptions to strict invariance are items 11 and 19 wherein higher observed scores are expected from assault and non-assault groups, respectively.

Summary and Concluding Discussion

The present study attempted to clarify inconsistencies within the literature regarding the factor structure of the DES. Using EFA, two plausible solutions were identified. Consistent with previous research, a possible 1-factor solution containing all DES items emerged; however, confirmatory analysis failed to support this single-factor structure. In contrast, a 2-factor structure containing 19 DES items was supported within CFA, suggesting that the DES is multidimensional. This 2-factor structure also was examined for stability in women with and without a history of sexual assault. The model was observed to be largely invariant across subsamples (with the exception of DES items 11 and 19), providing further support for the stability of this structure.

Conceptually, our results suggest that the DES captures two distinct dimensions of dissociative experiences. The first factor resembles typical episodes of dissociative phenomena such as absorption. The second reflects dissociative experiences that are less typical such as feeling as though one's body is not one's own. Relative to other studies, our research is the first to identify a 2-factor structure of the DES; however the conceptual content of these factors is echoed in related studies within the larger DES literature (e.g., Carlson et al. 1991; Schwartz et al. 1991). Overall, this model provides support for a robust factor structure which captures two distinct types of dissociative experiences that differ qualitatively as well as based on severity.

Several items failed to load on either dimension in the current study. Although the specific number of items excluded in previous studies varies, some items have consistently been discarded in an attempt to achieve a parsimonious structure (e.g., blanking out while driving, finding unfamiliar things among one's belongings, being approached by people one doesn't know who call one by a different name, and not remembering important events in one's life). Consistent with results from the current study, this research suggests that some items included on the original scale hold ambiguous associations with dissociative dimensions underlying the DES.

Results of this research advance the literature through the use of both EFA and CFA to isolate underlying dimensions of dissociative experiences. As is common with EFA, the results of Study 1 provided multiple solutions that were equally plausible given conceptual and statistical grounds. Comparison of these models under the more restrictive conditions of confirmatory analysis, however, demonstrated a clear advantage of a 2-factor structure specifying distinct, but strongly related, ABS and DDA dimensions. These analyses suggest that a common dissociative factor is insufficient to account for the covariance in the current data and support a model containing multiple dimensions of dissociative tendencies. Furthermore, given the ambiguity surrounding variability in EFA solutions in the present data, the use of a confirmatory model in the present study represents a significant contribution to the existing literature. The current report further advances research in this arena by addressing a collection of statistical issues that have been neglected in previous studies (e.g., data skew).

Finally, this study was the first to compare individuals with and without exposure to sexual assault on the structure of DES responses. Although research has identified an association between dissociative experiences and distressing events, few studies have directly examined the impact of such events on the measurement of dissociation. Results of the present research demonstrated consistency across assault and non-assault groups, providing further support for the validity of the 2-factor structure.

The current research is not without limitations. First, the sample data were limited to college females which limit the generalization of results. Given that research has found differences in frequency of absorption items across sex (Sanders and Green 1994) and because dissociative tendencies tend to decrease with age (Torem et al. 1992), future studies should determine the consistency of the 2-factor structure across more diverse samples. Research also suggests that the factor structure of the DES may differ within clinical populations (Carlson et al. 1991; Dunn et al. 1994). Future studies are encouraged to validate the 2-factor structure across clinical samples, particularly among individuals reporting dissociative symptoms. As is common to all factor analytic research, the possible solutions generated are limited to the items being measured. Given that the DES was initially developed as a

screening instrument for dissociative disorders, the measure may not include certain types of dissociative experiences relevant for individuals with certain forms of trauma exposure, including sexual assault. A final limitation to this research is that only one type of potentially traumatic event (i.e., sexual assault) was assessed. Given that multiple types of traumas have been linked to dissociative experiences (Ozer et al. 2003), additional research is needed to verify the 2-factor structure of this measure across other forms of trauma.

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