

Coping in the chair: The validation of the Monitoring Blunting Dental Scale

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This is an Accepted Manuscript of an article published by Taylor & Francis Group in *PSYCHOLOGY, HEALTH & MEDICINE* in 2012 (Volume 7, Issue 3, pp. 274–284), available online at: <http://www.tandfonline.com/10.1080/13548506.2011.601748>

This accepted manuscript has been modified slightly from the format in which it was originally submitted (i.e. tables and figures have been inserted into the main text).

Validating a measure of children's monitoring-blunting coping styles in dental situations

The monitoring-blunting theory of coping suggests that when faced with a threatening situation, individuals can respond by either *monitoring* or avoiding (*blunting*) threatening information. The current study sought to validate a scale of children's preferences for monitoring or blunting in dental situations (the Monitoring Blunting Dental Scale or MBDS). The psychometric characteristics of the scale were assessed in a sample of 240 New Zealand children aged 11–13. Reliability was adequate for both monitoring ($\alpha = .74$) and blunting ($\alpha = .76$) subscale scores. Convergent validity was indicated by strong correlations ($> .6$) between the measure's subscales and those of a related scale, although discriminant validity with respect to dental anxiety was problematic for the blunting subscale. Exploratory factor analysis supported a two-factor monitoring-blunting model, although confirmatory factor analysis indicated reasonable but imperfect fit for this model, $SB\chi^2(251) = 510.7, p < .001$, $RMSEA = .066$. We reflect on conceptual issues which may underlie the difficulties experienced here and elsewhere in developing psychometrically sound measures of Miller's blunting construct, and suggest that the monitoring subscale of the study scale may be most useful to other researchers.

Introduction

Dental anxiety is a phenomenon with serious negative oral health correlates (Armfield, Slade, & Spencer, 2009; Doerr, Lang, Nyquist, & Ronis, 1998; Schuller, Willumsen, & Holst, 2003), including avoidance of dental care (Schuller et al., 2003; Sohn & Ismail, 2005). Epidemiological studies have reported high prevalence rates of dental anxiety in children, often of above 10% (e.g. Chellappah, Vignehsa, Milgrom, & Lam, 1990; Lee, Chang, & Huang, 2007). Given this prevalence, recent studies have investigated how individual coping styles might inform the understanding of dental anxiety and of effective anxiety-reducing interventions.

Theoretical framework: Coping styles and the congruency hypothesis

Miller's (1981) theory of monitoring and blunting coping styles has sparked strong interest in dentistry (e.g. Litt, Nye, & Shafer, 1995; Muris, De Jongh, van Zuuren, & Ter Horst, 1994; Muris, Merckelbach, & De Jongh, 1995). Miller suggested that in threatening situations where the threat is not controllable by the individual, attending to or *monitoring* threatening information is not useful. Rather, increased information may maintain distressing arousal. Distraction from, and avoidance of, threatening information (*blunting*) then becomes a more useful strategy. Miller went on to suggest that individual variations can impact on the utilisation of coping strategies, with some individuals consistently preferring either monitoring or blunting strategies across situations.

A key to the usefulness of monitoring/blunting coping theory is the congruency hypothesis. This hypothesis states that interventions that are congruent with an individual's preferred coping style will be more effective in reducing distress (Christiano & Russ, 1998). Support for this hypothesis has been found in samples including women experiencing

childbirth (Shiloh, Mahlev, Dar, & Ben-Rafael, 1998), patients experiencing tooth extractions (Litt et al., 1995) and children experiencing general dental care (Christiano & Russ, 1998). Non-significant interactions between coping style and intervention type have also been reported, however (Muris, de Jongh et al., 1995; van Zuuren, 1998).

Understanding individual variations in coping style and how coping styles interact with anxiety-reducing interventions requires validated measures of individual coping style preferences. Examples of monitoring-blunting scales include (among others) the Miller Behavioral Style Scale (Miller, 1987) and the Child Behavioral Style Scale (CBSS: Miller, Roussi, Caputo, & Kruus, 1995). We found no scale measuring monitoring-blunting preferences specifically in dental situations.

Aims of the current study

The aim is to assess the reliability and validity of a measure of children's monitoring-blunting preferences in dental situations: the Monitoring Blunting Dental Scale (MBDS), originally proposed in a conference presentation by Buchanan and Niven (1996). Development of a scale designed specifically for the context of interest (dental situations) is important given that Miller (1981) proposed that both situational and individual variables influence whether monitoring or blunting strategies are utilised. The particular dimensions of reliability and validity assessed in this study are internal consistency reliability, convergent validity, discriminant validity, and factorial validity (using both exploratory and confirmatory factor analysis).

Method

Participants and procedures

Participants were a convenience sample of 240 New Zealand (NZ) children aged 11 to 13 years old (mean 11.8 years), with 56 percent boys. The children attended one school in a community of middle to high socioeconomic status. The sample was 64% European, 11% Asian, 10% Māori, and 10% Pacific, with 5% of other or unstated ethnicity. Participants were considered to be old enough to complete the survey without assistance, and of the same age range as the intended audience for the validated scale. The sample size was above the minimum of 200 cases that the Monte Carlo study of Boomsma (1987, p. 270) found to offer “relatively solid” robustness of parameter estimates to normality violations when using structural equation modelling with maximum likelihood estimation.

A passive parental consent procedure was used. Information packs sent to parents included a “declined-consent” form. Two only were returned. Children were also given the opportunity to decline to participate when data collection commenced in their classrooms. Of approximately 275 potential participants in the school, 240 useable questionnaires were collected, with the majority of non-responses being due to children’s absence from school. The Massey University Human Ethics Committee approved the study (protocol #09/37).

Measures

Study scale: The Monitoring Blunting Dental Scale (MBDS).

The MBDS asks children how they would respond in four dental scenarios (see Table 1 for example items). Each scenario has six coping options, comprising three monitoring and three blunting behaviours. Participants responded on a four-point scale indicating how likely

they would be to engage in each coping strategy. Responses were summed separately across monitoring and blunting items, resulting in two subscale scores each having a possible range of 12–48. A small number of items were modified from those originally proposed by Buchanan and Niven (1996), based on attempts to make the scale’s coping behaviours as relevant and comprehensible as possible, for modern NZ youth. For example, in the tooth-drilling scenario, the original item “I would have as many daydreams as I could” was replaced with “I would watch the TV on the wall, if there was one”.

Table 1

MBDS scenarios and example items

Scenario	Example item (subscale in brackets)
1. If you had to go to the dentist tomorrow	3. I would keep myself busy to take my mind off the appointment (BLUNTING)
2. If you were sitting in the waiting room waiting to have a filling done	11. I would read all of the posters on the wall about tooth decay and dental treatment (MONITORING)
3. If you were about to have a tooth drilled	14. I would watch the TV on the wall, if there was one (BLUNTING)
4. If you were about to have an injection in your gum	23. I would want the dentist to tell me exactly what he or she was doing step-by-step (MONITORING)

Convergent validity criterion: The Child Behavioral Style Scale–Medical (CBSS-M).

The Child Behavioral Style Scale–Medical (CBSS-M) was adapted from the original CBSS (Miller et al., 1995) for the current study, utilising the doctor and dentist scenarios from the original in order to focus on the most relevant scenarios for dentistry. While the original CBSS was designed for verbal administration, the adapted CBSS-M had some minor wording changes and required written responses. Monitoring and blunting subscale scores were obtained by summing responses across the eight monitoring and eight blunting coping items.

Discriminant validity criterion: The Smiley Faces Paper Scale (SFPS).

A pen and paper dental anxiety measure was used to measure discriminant validity of the MBDS with respect to dental anxiety. We named this scale the Smiley Faces Paper Scale (SFPS). The SFPS asks participants how they would feel in the same four dental scenarios used in the MBDS. Participants responded by selecting one of seven faces for each scenario (see Figure 1). The SFPS was based on two computerised dental anxiety scales for which evidence of construct validity and reliability has previously been reported: the Smiley Faces Program (Buchanan, 2005) and the Smiley Faces Program Revised (Buchanan, 2010; Jones & Buchanan, 2010).



Figure 1. Response scale for the SFPS.

Data analysis

The SPSS expectancy maximisation imputation approach was used to impute missing data; just 1.66% of the possible data points were missing. Confirmatory factor analysis (CFA) was completed in the R package lavaan version 0.4–7 (Rosseel, 2011) using ‘MLM’ estimation. The MLM method is similar to maximum likelihood but had the advantage of providing fit statistics scaled for the breaches of multivariate normality present in the MBDS data (Mardia coefficient = 78.9, critical ratio = 17.3). Exploratory factor analysis (EFA) was implemented using the R package psych version 1.0-96 (Revelle, 2011). Bias-corrected and accelerated (BC_a) bootstrap confidence intervals for both EFA and CFA were calculated using the R package boot version 1.2-42 (Canty & Ripley, 2010), providing additional robustness against violations of multivariate normality.

Results

Descriptive statistics

The mean subscale score was 29.59 ($SD = 5.46$) for the monitoring subscale, while the mean of the blunting subscale ($M = 31.62$, $SD = 5.37$) was slightly larger, paired $t(239) = 4.96$, $p < .001$. No significant gender differences were observed in mean scores for either subscale. No significant age effect was found for the monitoring subscale, but mean blunting subscale scores did differ significantly by age, $F(2, 228) = 6.783$, $p = .001$, with the 11 year old group exhibiting a somewhat higher mean blunting score, $M = 33.31$, than either the 12 year olds, $M = 30.56$, or the 13 year olds, $M = 30.82$. Correlations between items were moderate for both item pairs within the monitoring subscale (mean coefficient = .19) and

within the blunting subscale ($M = .21$), while correlations between items not in the same subscale were smaller ($M = .08$).

Exploratory factor analysis

Exploratory factor analysis (EFA) provided a preliminary examination of the latent factor structure of the MBDS scale. Factor analysis was preceded by a principal components analysis (PCA), as suggested by Velicer, Eaton and Fava (2000). The purpose of the initial PCA was to allow the use of Velicer's (1976) minimum average partial correlation (MAP) criterion for determining the number of factors/components: Velicer's MAP selects only those components that primarily explain shared variance rather than variance unique to individual items. Velicer's MAP has been found to outperform traditional factor selection rules such as the scree test and Kaiser's (1960) stopping rule (Zwick & Velicer, 1986).

Velicer's MAP suggested a two-component solution explaining 28.5% of the variance in the input matrix. Two factors were therefore extracted using principal axis factoring, a "true" factor analysis method that only analyses shared variance. Direct oblimin (oblique) rotation was applied to increase the interpretability of factors. A pattern matrix of factor loadings for the two-factor solution is presented in Table 2, indicating the unique relationship between each item and each factor while controlling for the influence of the other factor. Bootstrapping over 2000 resamples was conducted in order to determine confidence intervals for factor loadings, with an item considered to load on a factor when the 95% BC_a confidence interval for the loading excluded zero. The factor solution in each resample was rotated towards the oblimin-rotated solution in the initial sample data in order to ensure a common factor space across resamples (see Zientek & Thompson, 2007, for a discussion of the issues involved in bootstrapping in factor analysis).

The two factors essentially divided the MBDS items into their intended subscales (monitoring and blunting), and were moderately correlated, $r = .31$. Three items were highlighted as problematic. Item 2, from the monitoring subscale (“I would want to talk to my family and friends about the appointment”) cross-loaded across both factors, while item 4 (“I would not want to talk about the appointment with anyone”) and item 5 (“If there was a programme about going to the dentist on the TV I would watch it”) loaded on neither factor.

Table 2

MBDS: Pattern matrix of loadings for the 2-factor exploratory factor analysis model

Item	Intended subscale	Loading [95% CI]	
		Factor 1	Factor 2
22	Blunting	0.66 [0.51, 0.78]	-0.02 [-0.19, 0.11]
21	Blunting	0.59 [0.45, 0.72]	-0.05 [-0.21, 0.07]
12	Blunting	0.54 [0.38, 0.67]	0.09 [-0.08, 0.23]
14	Blunting	0.52 [0.35, 0.67]	-0.02 [-0.21, 0.11]
15	Blunting	0.51 [0.34, 0.65]	-0.03 [-0.17, 0.11]
19	Blunting	0.50 [0.32, 0.66]	0.01 [-0.18, 0.18]
7	Blunting	0.48 [0.25, 0.65]	-0.06 [-0.25, 0.14]
6	Blunting	0.46 [0.22, 0.63]	0.12 [-0.06, 0.35]
3	Blunting	0.43 [0.24, 0.59]	0.04 [-0.14, 0.22]
10	Blunting	0.32 [0.14, 0.51]	0.12 [-0.08, 0.30]
18	Blunting	0.28 [0.07, 0.45]	-0.05 [-0.25, 0.14]
2	Monitoring	0.22 [0.01, 0.41]	0.24 [0.02, 0.44]
17	Monitoring	0.02 [-0.12, 0.11]	0.71 [0.58, 0.84]
24	Monitoring	-0.05 [-0.25, 0.06]	0.69 [0.56, 0.81]
23	Monitoring	-0.03 [-0.15, 0.09]	0.67 [0.48, 0.81]
20	Monitoring	0.12 [-0.06, 0.27]	0.42 [0.26, 0.59]
13	Monitoring	0.11 [-0.06, 0.27]	0.42 [0.22, 0.58]
1	Monitoring	0.05 [-0.12, 0.23]	0.37 [0.16, 0.56]
8	Monitoring	0.10 [-0.10, 0.30]	0.36 [0.12, 0.57]
16	Monitoring	-0.13 [-0.33, 0.09]	0.34 [0.13, 0.53]
9	Monitoring	-0.01 [-0.20, 0.22]	0.32 [0.06, 0.52]
11	Monitoring	0.12 [-0.06, 0.30]	0.28 [0.07, 0.46]
5	Monitoring	0.14 [-0.06, 0.31]	0.16 [-0.03, 0.35]
4	Blunting	0.12 [-0.10, 0.36]	-0.01 [-0.26, 0.23]

Notes. Principal axis factoring utilised with oblimin rotation.

Items considered to load on a factor (i.e. 95% CI excludes zero) noted in **bold**. Confidence intervals calculated via the accelerated and bias-corrected (BC_a) method over 2000 bootstrap resamples.

Confirmatory factor analyses

A two-factor (monitoring and blunting) model was hypothesised for the MBDS on the basis of both theory and the results of EFA. A path diagram is presented in Figure 2 with completely standardised parameter estimates. Latent factor scaling was accomplished with marker variables selected on the basis of high within-subscale item-total correlations (items 17 and 22).

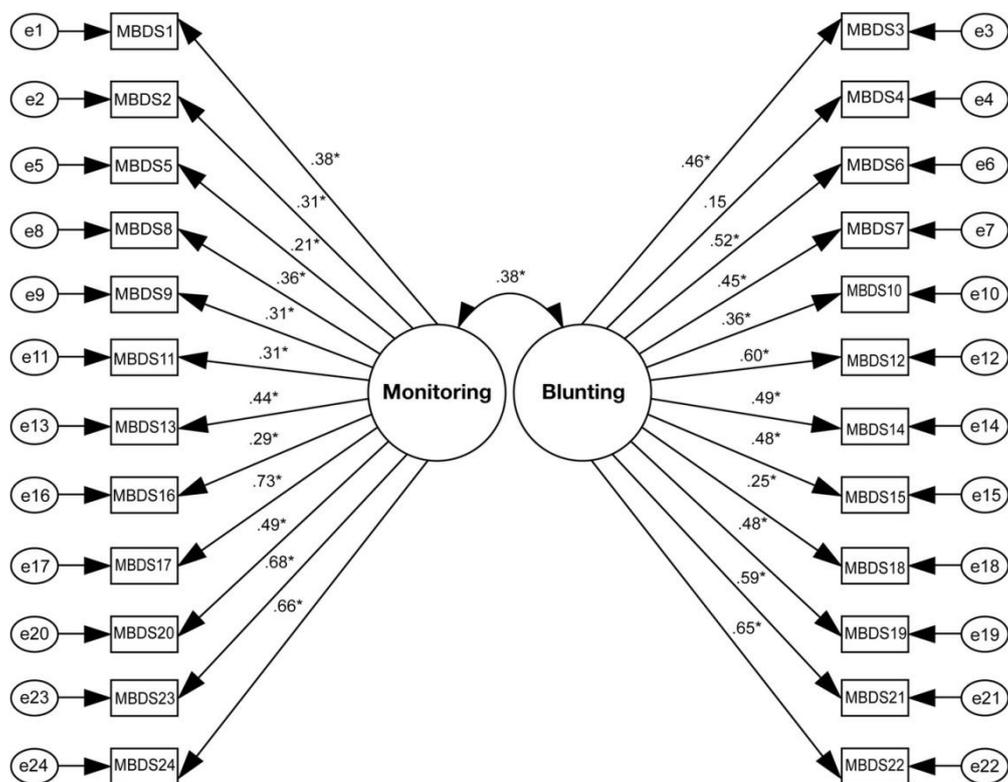


Figure 2. Path diagram for the MBDS two factor model with completely standardized parameter estimates.

Note. * $p < .05$ ** $p < .001$ (p values obtained via bias-corrected bootstrapping)

The Satorra-Bentler scaled test statistic for the two-factor model, $SB\chi^2(251) = 510.7$, $p < .001$, indicated that a null hypothesis of perfect fit could be rejected. The root mean

square error of approximation (RMSEA) of .066 nevertheless indicated reasonable fit relative to model complexity by the $< .08$ cut-off suggested by Browne and Cudeck (1993), and the standardised root mean square residual (SRMR) of .075 fell within Hu and Bentler's (1999) suggestion of a .08 cut-off for good fit. The comparative fit index (CFI) of .722 was poorer, however. The CFI and RMSEA statistics noted here were "robust" versions calculated using the $SB\chi^2$.

Regression weights were statistically significant (i.e. 95% BC_a confidence interval excluded zero) for all items at the .05 alpha level, except item 4 ("I would not want to talk about the appointment with anyone"). The monitoring and blunting factors were moderately correlated, $r = .38$. Item 2, a monitoring item which cross-loaded in EFA, was the only item with a modification index suggesting a significant but small improvement in fit by allowing a cross-loading.

Internal consistency reliability

Cronbach's alpha was .74 for the MBDS monitoring subscale, and .76 for the blunting subscale, suggesting acceptable but modest reliability. Four items (including items 4 and 5, which were problematic in EFA) had slight negative contributions to reliability, but deletion of these items (either individually or in combination) did not increase the alpha value for either subscale by more than .015. All items were therefore retained in all analyses reported. For the CBSS-M, reliability was acceptable for the monitoring subscale ($\alpha = .73$), but poorer for the blunting subscale ($\alpha = .63$). The SFPS dental anxiety measure displayed excellent reliability considering its short length ($\alpha = .84$).

Multi-scale analyses: Convergent and discriminant validity

The convergent and discriminant validity of the MBDS summated subscales was examined with reference to the subscales of the CBSS-M and the SFPS dental anxiety measure (Table 3). Strong correlations between the MBDS blunting and monitoring subscales and their CBSS-M counterparts supported the convergent validity of the scale. Discriminant validity was strong for the MBDS monitoring subscale, but the correlation of .48 between the MBDS blunting subscale and dental anxiety suggested that discriminant validity with respect to dental anxiety was problematic for this subscale.

Table 3

Convergent and discriminant validity coefficients

	<i>r</i>	<i>p</i>	95% CI
Convergent validity			
MBDS Monitoring <--> CBSS-M Monitoring	.61	<.001	.52–.68
MBDS Blunting <--> CBSS-M Blunting	.66	<.001	.59–.73
Discriminant validity			
MBDS Monitoring <--> SFPS Dental Anxiety	.08	.221	-.05–.20
MBDS Blunting <--> SFPS Dental Anxiety	.48	<.001	.37–.57
CBSS-M Monitoring <--> SFPS Dental Anxiety	.19	.003	.07–.31
CBSS-M Blunting <--> SFPS Dental Anxiety	.24	<.001	.12–.35

Note. 2-tailed *p* values shown.

Discussion

Reliability and validity of the MBDS

The results indicated that scores on the MBDS subscales demonstrated acceptable internal consistency, reliability, and convergent validity. A two-factor solution was indicated in EFA, a finding coherent with the scale's two-subscale construction. The fit of this two-factor monitoring-blunting model in CFA was somewhat equivocal, however, with the significant Satorra-Bentler scaled test statistic providing evidence that the model was at least partially misspecified. Discriminant validity of the blunting subscale with respect to dental anxiety was also problematic.

The latter finding echoes a common theme of difficulty developing psychometrically sound measures of Miller's blunting construct. In other studies it has been the reliability of the blunting subscale of the various monitoring-blunting scales that has been problematic (for example, see the review of reported reliability coefficients for the Miller Behavioral Style Scale by Rees & Bath, 2000). In the current study, rather than reliability problems, it was the discriminant validity of the blunting subscale with respect to dental anxiety that was problematic. The reason that a blunting-dental anxiety relationship was observed here and not in other studies (e.g. Muris, De Jongh, van Zuuren, & Schoenmakers, 1996; van Zuuren, de Groot, Mulder, & Peter, 1996) might be explained by other monitoring-blunting scales measuring coping across a range of scenarios, possibly obscuring a within-situation anxiety-blunting relationship. On the other hand, the MBDS measures anxiety specifically in dental scenarios—the same four scenarios used in the SFPS dental anxiety measure, in fact.

The causes of the psychometric difficulties involved in measuring blunting may be related to the conceptual scheme they are guided by. Internal consistency difficulties may be explained the diversity of strategies that can be considered as blunting, for example: Miller

(1981) defined distraction, self-relaxation, detachment, reinterpretation, intellectualisation and denial as all representing blunting. Further, it may be difficult to distinguish avoidance of a feared stimulus, a key symptom of anxiety, from the avoidance of threatening information that is considered blunting—which might explain the MBDS blunting subscale’s weak discriminant validity with respect to dental anxiety. Given these difficulties, Miller’s recent approach (e.g. Miller et al., 1999) of giving greater focus to monitoring than blunting subscale scores appears well warranted. We therefore might expect the MBDS monitoring subscale to be most useful to interested researchers.

One arguable strength of the MBDS is also a potential weakness: Unlike other monitoring-blunting scales, the MBDS focuses on a specific range of dental scenarios. This may make the MBDS more likely to predict children’s actual coping behaviour in dental situations, but also means that it may not be a valid measure of children’s general coping preferences. A situational dimension of particular importance is controllability; with Miller (1981) suggesting that blunting is the preferable coping modality in uncontrollable situations. Given that decisions about dental treatment for children are likely to be strongly influenced by parents, caregivers and dental staff, we suspect that the MBDS scenarios represent relatively uncontrollable situations for children. This view is reinforced by the mean scores on the blunting subscale being significantly higher than for the monitoring subscale. In future it may be useful to assess children’s perceptions of the controllability of the MBDS scenarios, and how these perceptions relate to preferences for monitoring vs. blunting coping strategies.

Potential for revisions

Three items in the MBDS had consistently weak loadings on their intended constructs in exploratory and confirmatory factor analysis (and a cross-loading, in one case), and poor contributions to reliability. These items (items 2, 4 and 5) were described in the exploratory

factor analysis sub-section; all three contained long words (appointment, programme), possibly increasing measurement error. They were also all from the first and least threatening MBDS scenario. These items were not deleted in the current study given the minimal improvement to reliability and validity resulting from such deletions, but re-wording or replacement of these items in future may be of benefit.

Limitations and directions for future research

Limitations of the study include non-random sampling and the use of convergent and discriminant validity measures that had not been validated in exactly the forms in which they were used. The test-retest reliability of the MBDS was not assessed, to minimise the time burden the participating school. In future studies the assessment of test-retest reliability and the validation of the MBDS with more diverse samples could be beneficial. The production of norms or other means for the interpretation of individual scores is required if the scale is to be used in applied clinical settings. Content validity was also not formally assessed; quantitative methods for the assessment of content validity have been developed (for an example of two such methods see Wynd, Schmidt, & Schaefer, 2003), and may be useful in future research with the MBDS. Face validity was likewise not formally assessed, although the restriction of the MBDS stimulus scenarios to its intended domain of application (dental scenarios) is likely to aid its face validity.

Conclusions

The findings of this study provide evidence to support the reliability and construct validity of the MBDS, although areas of concern such as discriminant validity of the blunting subscale and factorial fit are present. The MBDS (and especially its monitoring subscale)

may be useful to researchers concerned with coping styles in children experiencing dental care, and with further validation may have utility in applied dental settings.

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2012
