Validation of the Lifestress Inventory for People with a Mild Intellectual Disability

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Abstract

The Subjective Stress Scale (SSS: Bramston & Bostock, 1994) was developed to measure stress in people with a mild intellectual disability. In previous research, the SSS was found to measure two broad dimensions of stress, the first a General Worry factor, the second a factor that tapped concerns about Negative Interpersonal Relations (Bramston & Fogarty, 1995). The present study sought to continue this line of research by introducing a slightly modified form of the SSS, to be known as the Lifestress Inventory (LI) and examining the psychometric properties of the scale when administered to a new sample of 221 people with mild intellectual disabilities. Confirmatory factor analysis indicated that three underlying factors corresponding to General Worry, Negative Interpersonal Relations, and Coping were sufficient to account for the correlations among the items in the LI. Rasch analysis indicated some improvements to the scoring format for the LI and also showed that the most easily experienced stressors were associated with the Negative Interpersonal Relations dimension. The refinements introduced by the LI and the further demonstration that some of the broad stress dimensions identified in the general population can also be found in people with an intellectual disability represent important milestones for researchers interested in exploring reactions to stress among this population.

Validation of the Lifestress Inventory for People with a Mild Intellectual Disability

One of the most frequently used models of stress is that proposed by Lazarus and Folkman (1984). This model holds that individuals get stressed when they perceive a threat to their self-esteem or security and are not confident that their coping mechanisms will be able to mediate and control this threat (Roe & Gray, 1991). In this model, the orientation is clearly on individuals and their particular interactions with the environment. The construct of stress, however, can also be examined at the group level, where the principal question becomes whether or not there are unique features of the subgroup or culture that may alter the nature of the stress response (Eckenrode & Bolger, 1995).

The group approach to the study of stress enables researchers to explore themes particular to identified groups. It assumes that several people may share common cognitive themes such as severe illness or unemployment and that these themes may be a feature of both the minor hassles and major life events that they experience (Zautra, Guarnaccia, Reich, & Dohrenwend, 1988). This thematic approach to stress appears particularly relevant in fairly homogenous groups that share similar environments or concerns and it offers researchers the possibility of building models of highly relevant perceived threats and vulnerabilities in groups.

The construction and preliminary validation of a questionnaire measuring stress for HIV positive homosexual men (Nott & Vedhara, 1995) is one example of stress being measured in a relatively homogeneous group. The resultant measure, the Gay Affect and Life Events Scale, taps five event factors and five stress factors. Some of these factors overlap with commonly reported elements of stress scales, such as social support and coping, and some of the factors were more population specific, such as self-esteem. In another example of the group approach to measuring stress, anorectic adolescent girls showed significantly more negative life events associated with parents and family members than did controls or patients with other diagnoses (Horesh et al., 1995). Researchers have identified the major dimensions of stress within the population of mainland China (Zheng & Lin, 1994), in teachers (Borg, Riding & Falzon, 1991), in migrant East Germans (Jerusalem, 1993) and in elderly people of Nigeria (Sijuwade, 1994). Thus, there appears to be a growing acceptance that stress is a construct with some common elements and some elements that are associated with specific groups. The stable, enduring features of stress seem to involve such elements as general worry or anxiety, a coping and personal resources factor, and an interpersonal/support factor (Martin, Kazarin, Shahe, Breiter, & Hans, 1995). The group-specific aspects of stress appear tied to environmental issues such as housing conditions and employment status for migrants (Jerusalem, 1993) or student misbehaviour and professional identification in the teaching profession (Boyle, Borg, Falzon, & Baglioni, 1995).

Both the general and the specific aspects of stress are important when researching groups within the population. In the teaching profession, for example, it is important to be able to compare general stress levels with that experienced in other occupations (Pithers & Fogarty, 1995), as well as being able to pinpoint particular sources of stress in this group (e.g., Boyle et al., 1995). Thus, measures of stress for identifiable groups should be able to demonstrate what the groups have in common with the rest of the population as well as what is peculiar or more salient within that group.

People with intellectual disabilities form an identifiable group within society in which stress has yet to be systematically explored. There is now increasing evidence to suggest that such people do perceive themselves as experiencing stress (Bramston & Fogarty, 1995). Furthermore, the stress symptoms they experience stem from the same general dimensions already identified in the wider population, although the salience of the dimensions varies somewhat. This work has important implications for people with disabilities, for support workers and for medical practitioners in the field, a point acknowledged by Schalock & Kiernan (1990) who noted the need for stress reduction and stress innoculation programs amongst this group. Before this can be done, more exploratory work is needed on the nature of the stress experience for people with mild intellectual disabilities.

Aims

This study continues the work of validating a stress scale for populations with mild intellectual disabilities. The scale in question is the Subjective Stress Scale (SSS: Bramston & Bostock, 1994; Bramston & Fogarty, 1995) which has been modified slightly for the present study and given a more convenient name: the Lifestress Inventory (LI). The first aim of the study was to gather further normative data for the scale by noting the frequency with which the various items were endorsed. The pool of items that served as the basis for the original SSS was formed by asking people with mild intellectual disabilities, as well as an expert panel of professional workers, what were the main sources of stress for this population. The resulting SSS contained the most frequently mentioned stressors. The LI contains almost the same list of stressors as the SSS and an important aspect of the validation of the scale consists of checking to see whether the endorsement rates for common items are much the same across different samples of people with intellectual disabilities.

A second aim was to improve aspects of the administration of the LI, notably the scoring system, which employed a Likert-style response format with what appeared to be uneven distances between some of the response categories. Since the introduction of Likert response formats in the 1930's, researchers have tended to focus on the meaning of the total score obtained from a test. Prior to that, Thurstonian techniques had encouraged researchers to focus on the scaling properties of the individual items that made up a test. When Likert (1932) originally developed his procedures for quantifying and studying attitudes, he investigated the desirability of weighting or scaling the categories that he used in his new response format. However, he concluded that if successive response categories were scored with successive integers (say, 0-4), the results were much the same as those obtained when the categories were scaled. Because item scaling was a tedious and difficult process, most researchers adopted the Likert format with alacrity. The use of a rating scale (e.g, 0-4) for each item permitted summation of scores across items, thus quantifying the individual's attitude on whatever was being measured. It was a time-saving device and useful for quantification, but it encouraged researchers to ignore the scaling properties of the items themselves.

Procedures developed by Rasch (1960) re-introduced the notion of item scaling and provided more convenient models for estimating the scaling properties of items. The early forms of the Rasch model, however, were not applicable to Likert items. The Multiplicative Binomial form of the Rasch model, introduced by Andrich (1975),

overcame this limitation by encompassing a wider range of response formats, including Likert style items. The Rasch model is introduced more fully in a later section of this paper. For the moment, suffice it to say that Rasch analysis provides sample free estimates of the extent to which individual items in a unidimensional scale are measuring the underlying construct. It locates items on a continuum with a true zero point and equal measurement units extending in either direction. In addition, the Multiplicative Binomial form of the Rasch model tests to see whether the response categories within individual items conform to a linear continuum. That is, whether the various response categories (e.g., 0-4) lie on the same continuum with 0 defining the low end and 4 the upper end for each item.

Both of these properties of the Multiplicative Binomial contribute to the aims of the present study. The analysis of the steps between the categories provided a means of testing whether it is legitimate to treat a response categories used in the LI of 0 ("Not experienced a stressor") as being on the same continuum as a response category of 1 ("Experienced but did not create stress", 2 ("Experienced and it created some stress", 3 ("Experienced and it created moderate stress"), and 4 ("Experienced and created a great deal of stress"). Evidence that any one of these categories is not on the same continuum would not invalidate the use of this reponse format but it would suggest some modifications to the scoring procedure. The capacity of the Rasch procedures to locate individual items on a linear continuum representing the dimension being measured provided a way of assessing the areas of the latent trait being tapped by the items of the current version of LI. It is important to know whether some stressors or stress dimensions are "easier" to experience than others. Frequency data reflecting item endorsement rates provide one means of making this judgement but Rasch analysis is much better suited to this purpose and was used to achieve this aim. These analyses can also be extremely useful in deciding where there is overlap between items and where new items need to be added to the scale.

The final aim was to test different models of the structure of the LI, following uncertainty in the previous study (Bramston & Fogarty, 1995) as to the appropriateness of one-factor, two-factor, or solutions based on some other number of factors. Exploratory and confirmatory factor analysis were used for this purpose.

Method

Participants

The sample was drawn from different geographical regions to those used in the Bramston and Fogarty (1995) study and consisted of 238 people, all of whom met three selection criteria: a) according to agency files, they functioned in the mild range of intellectual disability; b) on the basis of staff reports, they had adequate conversational skills; and c) they volunteered to participate in the project after it was explained to them. The mean age of the group was 22.4 years with 65% males and 35% females. Almost all participants worked in one of the five Sheltered Workshops approached to take part in the study. There was no overlap between the sample used here and those used in the earlier studies with this scale.

Measures

Subjects completed the Lifestress Inventory (LI), formerly known as the Subjective Stress Scale (SSS). Previous research on this scale has indicated that it is both reliable and valid for use with an intellectually disabled population (Bramston & Bostock, 1994; Bramston & Fogarty, 1995). When used as a global measure of stress, the scale has been shown to have a Cronbach alpha coefficient of 0.84, an inter-rater reliability of .87, and a test-retest reliability over two weeks of .80 (Bramston & Bostock, 1994). When separate subscales are derived, the internal consistency estimates for these subscales have also been quite acceptable (Bramston & Fogarty, 1995).

The LI was not exactly the same as the SSS. On the basis of previous studies, some items were deleted and others added. For example, the item Restrict ("Have you ever wanted to do something and never been given the chance to try?") was factorially complex in the SSS. That is, it tended to load across all factors in the two- and four-factor solutions, suggesting that it measured a general stress tendency. This item was replaced in the LI by an item called Upset ("Have you ever felt upset with anyone over the past few weeks?"). The new item was intended as a general, single-item indicator of overall stress levels. Two new additional items called Ignore ("Do people ignore you when you have something to say?") and Choose ("Do other people choose things for you?") were added. Both of these items were included as reliability checks. Ignore was a reworded version of an item called Listen ("Do people take notice of what you have to say?") and Choose was a reworded version of Choice ("Do you get to choose things that are important to you?").

With these changes, the LI contained 33 items, each in the form of a simple statement. The possible response categories were: '0', indicating that the subject had not experienced this stressor; '1', indicating that this source of stress had been encountered but had not given rise to any feelings of stress; '2', to indicate some stress; '3', a moderate amount; and '4' a great deal of stress. To assist understanding, pictures of partially filled water buckets were shown to the respondents so that they could, if they wished, simply point to the one best representing the amount of stress that the item created for them. The same response format was used in the SSS and there is evidence that, when administered by a trained interviewer, the items are quite intelligible to a population with mild intellectual disabilitys (Bramston & Bostock, 1994).

Procedure

Lifestress was administered by trained interviewers at the participants' workplace. Participants were advised of the strict confidentiality maintained with these data and of their right to withdraw at any time without reason. A simple definition of stress - 'the things that happen to you that you can't cope with' - was given to them at the start of the interview sessions. All discussion and explanations of stress remained consistent with the Lazarus and Folkman (1984) model of threats to coping ability. Those who appeared not to understand the concept of stress were not included in the study. During administration of the scale, questions were repeated or reworded if necessary to ensure clarity. To minimise response bias, after every reponse the participants were asked a clarifying question that sought more information about the event(s) in question. These prompts fitted quite smoothly into the conversation and often enabled the subjects to expand or clarify what they wanted to say. Any questions that the interviewer felt were partly or

wholly misunderstood were scored as missing data and not used within the analyses. In this study, half of the data were collected by a single female interviewer. The remaining data were collected by one of two male interviewers. All interviewers were clinically trained and were familiar with the scale.

Results

The LI is intended to provide an indication of the various types of stressors affecting individuals with mild intellectual disabilitys and, by summing scores on the items that make up the scale, to give an overall estimate of the amount of stress experienced by a given individual. Thus, it has both qualitative and quantitative aspects. The quantitative aspects show as impact scores calculated by this summing process. The qualitative aspects are best shown in the form of a frequency table depicting the reponse patterns for all items of the scale. The frequency data thus provide some indication of the success of each item in capturing sources of stress for this population. Some changes were introduced in forming the LI from the SSS, but most of the items remained the same, so the data generated in this study are presented alongside those reported in Bramston and Fogarty (1995) to give a better idea of how much variation there was across different samples. The frequencies, reported as percentages, are shown in Table 1.

Table 1

Percentages for Various Response Categories for All Items (N=238)

Item	Response Categories					
	Not Experienced	No Stress	Some Stess	Moderate Stress	A Great Deal of Stress	No Response (missing)
Choice	84 (77)	5 (8)	4 (7)	3 (3)	3 (3)	1 (2)
Privacy	78 (67)	2 (11)	8 (9)	4 (6)	7 (7)	1 (0)
Argue	53 (27)	2 (15)	14 (25)	9 (10)	22 (22)	0 (0)
Treatdf	65 (69)	4 (11)	8 (7)	4 (3)	12 (5)	8 (5)
Rights	81 (74)	3 (6)	5 (4)	1 (3)	9 (1)	2 (0)
Death	45 (47)	5 (12)	13 (18)	6 (7)	31 (16)	0 (0)
Partner	84 (51)	6 (15)	1 (11)	1 (7)	7 (6)	0 (0)
Family	85 (69)	1 (8)	4 (9)	4 (6)	5 (8)	0 (0)
Listen	63 (56)	3 (10)	13 (16)	7 (10)	13 (8)	3 (1)
Quick	64 (50)	2 (13)	11 (18)	5 (10)	13 (8)	5 (1)
Instrct	80 (75)	3 (9)	7 (10)	4 (3)	6 (3)	0 (2)
Unstyou	88 (74)	1 (12)	4 (10)	2 (2)	4 (2)	1 (0)
Bully	72 (53)	2 (7)	5 (12)	10 (7)	12 (20)	0 (0)
Interupt	56 (40)	3 (13)	13 (17)	8 (14)	18 (16)	0 (0)
Tease	61 (44)	4 (10)	7 (11)	8 (11)	19 (23)	1 (0)
Worksup	91 (81)	1 (8)	6 (5)	1 (4)	1 (3)	0 (0)
Coerce	73 (62)	3 (8)	7 (12)	5 (7)	11 (7)	1 (4)
Fights	73 (55)	1 (11)	7 (7)	6 (11)	13 (16)	0 (0)
Expect	82 (79)	3 (9)	5 (8)	4 (3)	2 (1)	2 (1)
Help	90 (82)	2 (9)	2 (5)	3 (3)	3 (1)	1 (1)
Crowds	71 (45)	12 (26)	3 (16)	4 (6)	10 (5)	0 (0)
Helpless	67 (52)	3 (11)	10 (10)	7 (6)	9 (3)	4 (18)
Informed	76 (76)	3 (9)	8 (8)	3 (3)	7 (1)	3 (3)
Find Job	85 (78)	2 (11)	5 (5)	2 (3)	6 (2)	0 (0)
Change	86 (67)	3 (14)	3 (10)	3 (6)	5 (3)	0 (0)
Home	86 (74)	1 (8)	3 (8)	6 (4)	4 (6)	0 (0)
Intrub	78 (54)	1 (12)	6 (18)	5 (4)	11 (6)	0 (6)
Friends	85 (74)	1 (11)	2 (10)	3 (3)	9 (1)	1 (0)
Cantdo	58 (52)	6 (11)	10 (12)	8 (4)	10 (7)	9 (14)
Likeyou	95 (87)	0 (7)	1 (2)	2 (0)	2 (3)	0 (0)
Ignore	74	1	8	6	8	2
Upset	66	2	12	5	16	0

Note:Figures from Bramston and Fogarty (1995) are shown in brackets.

The pattern of "Yes" and "No" responses was examined for acquiescence response bias. There was no evidence of subjects saying either "Yes" or "No" repeatedly over lengthy series of consecutive items. It can be seen from Table 1 that the pattern of responding was fairly similar for the two samples, although there was a tendency for more of the current sample to say that they had not experienced certain stressors. The item called Partner ("Have you been getting on with your partner/girlfriend/boyfriend?") is a good example of this trend. In the earlier sample, 51% said that they had not experienced this stressor. In the current sample, this proportion was 84%. Of more interest are those items that were very infrequently experienced by either sample. The item Likeyou ("Do people like talking to you?") is one such item with very few individuals in either sample indicating that it taps a source of stress. Other items in this category include Help ("Can you get enough help when you want it or need it?"), Worksup ("Do you get on with your supervisor/teacher?"), and Choice ("Do you get to choose things that are important to you?").

The performance of the new items was also an important consideration in the early stages of data analysis. Upset, the replacement item for Restrict, attracted a high endorsement rate, indicating that it was a source of stress. In fact, its pattern of responses was very similar to that obtained with Restrict in the earlier study. Choose, a parallel item for Choice, attracted a very low endorsement rate with only 6% of the respondents indicating that this was a source of stress. It was significantly correlated with Choice (.32, $p < .001$) but was dropped from the scale at this point because of the extremely low endorsement rate and does not appear in Table 1. Ignore was significantly correlated (.33, $p < .001$) with its parallel item, Listen, and also attracted a reasonable endorsement rate so it was retained. Correlations between these parallel items, although significant, appear rather low but it must be remembered that the skewed distribution of responses for these items has imposed a limit on the correlations. This is a well-known feature of skewed data: the more skewed the data, the lower the maximum possible correlation. A rough approximation of the effect of this skewness can be gained by recoding the items so that they are are dichotomous and computing ϕ_{max} (Comrey & Lee, 1992), an index of the maximum possible correlation (phi is usually used, although Pearson's Product Moment correlation would also yield the same results) given the response distribution for the two items. When this was done, it was apparent that the limit for the Choice-Choose phi coefficient was .73. For the Ignore-Listen coefficient, the limit was approximately .57. In view of this, the correlations between the parallel items can be regarded as acceptable, although certainly not impressive.

Scoring Options for the LI

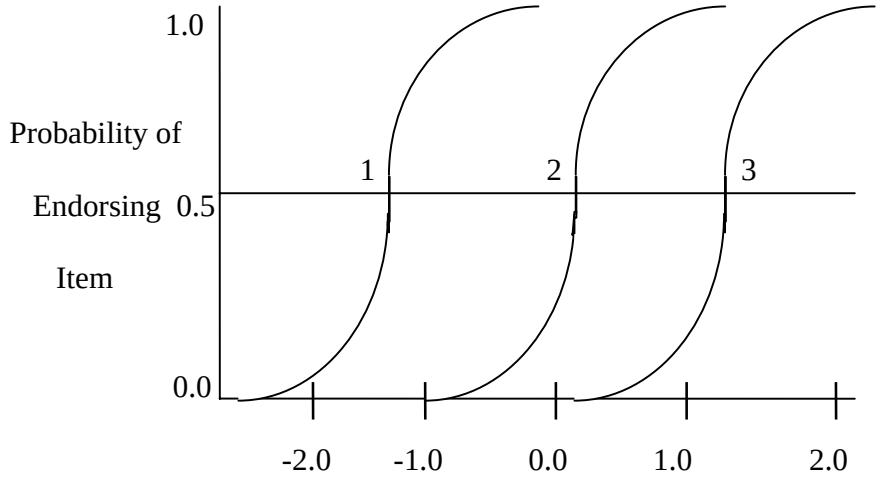
As mentioned in Bramston and Fogarty (1995), there are some aspects of the LI that make it rather difficult to decide exactly how many factors should be extracted. This is not an uncommon problem in factor analysis and there are rules that can be followed to assist in this process (see Carroll, 1993). Some of these go well beyond the simple rules of thumb offered by root one criterion and/or scree plots. The problems of factor extraction are exacerbated in the present case by the question format of the LI which employs five distinct response categories, the first one indicating that the stressor was not experienced. The very large proportion of reponses in this category is typical of stress scales (Hurst, Jenkins, & Rose, 1978) but creates extreme skewness for most variables. In

fact, this type of question format generates what are known as censored data and there are routines for normalising scores on the variables concerned. Bramston and Fogarty (1995), as part of their data screening procedures, used one such routine in PRELIS (Joreskog & Sorbom, 1988) to create an entirely new set of variables from the SSS. The resulting inter-item correlations were higher, yielding better commonality estimates in the factor analyses, but the factor patterns were much the same as those obtained with untreated data and the option was not pursued beyond the data screening stage. It is not a scoring technique that can easily be applied by those who might wish to use the scale.

The major problem with the SSS - and now the LI - is that it follows the Likert practice of using successive categories and assigning successive numbers to these categories without being able to show that the categories are indeed successive. This is not normally a problem with Likert-type items but here there is some doubt that the response category 0 is the same distance from 1 as the latter is from 2, and so on. It may well be that there is no difference at all between not experiencing a stressor and experiencing it but not feeling stressed. It is difficult to check the validity of these scaling assumptions using classical item analysis procedures because these procedures give little direction with respect to quantifying the affective value of items or to ordering the response categories within those items. Treating the data as censored provides a statistical solution to the problem but this is no help to people who want to use this scale and do not know whether the first two categories of the LI should be treated as the same or scored differently. In order to help decide such questions as whether the 0 and 1 response categories should be treated as identical, the latent trait models can be particularly useful. One pertinent model within the latent-trait family of models is the Rasch Model (1960) which has been applied to dichotomous scales (Wright & Stone, 1979) and rating scales (Wright and Masters, 1982; Andrich, 1975, 1981, 1982). The particular model introduced by Andrich (1975) is called the Multiplicative Binomial and is of interest here because it provides a perspective for unifying Thurstone's (1927) procedures for item scaling and the Likert procedure for attitude measurement. A brief introduction to some aspects of this model will help to illustrate how it can be used to help resolve the present dilemma about how best to treat the 0 and 1 response categories.

The main task of Rasch analysis consists of defining a latent continuum and then estimating the location of items and individuals on this continuum. The probability of a person endorsing a particular item is a function of the affectivity of the item and the attitude of the person. Because the probability is a function of both of these, it is not a single value and is usually represented diagramatically as an item characteristic curve (ICC). Curves for three different items are shown in Figure 1.

Figure 1
Examples of Item Characteristic Curves



The latent continuum is represented by the baseline. In the case of attitudinal measures, the baseline is said to represent affectivity. People with high levels of affectivity will endorse more items. Whilst this is true, the probability that an item will be endorsed is also a function of its location on this continuum. The location estimate for an item is given by the point on the baseline. In this figure, item one has a low affectivity value and a person would not need a lot of affectivity to endorse this item. The shape of the item characteristic curve shows the increasing probability of endorsing the item as affectivity increases. Item three, on the other hand, will only be endorsed by those with higher levels of affectivity. Someone with an affectivity level of about zero is scarcely likely to endorse the item but someone with a level of two is almost certain to endorse it. Item characteristic curves are very useful because they provide valuable information about the sections of the latent trait that are sampled by the existing items. This can lead to decisions to include more items to cover areas not presently covered or to delete some items in areas that are well-covered.

A rating scale consists of a series of ordered categories connected to each other by "steps". The number of steps is the number of response categories minus 1. For example, in the case of five categories, as used in the LI, four steps result. Rasch analysis permits the calculation of the thresholds for moving from one step to another within each item. Thus, a position (β_n) is established for each subject, a scale value (δ_i) is estimated for each item *i*, and r_1, r_2, r.., r_m "response thresholds" are estimated for m + 1 rating categories (See Wright & Masters, 1982). These conditional thresholds indicate the degree of affectivity required to move from one category of an item to the next. In a properly functioning Likert-type item, there should be a consistent increment (or decrement) from one step to another. That is to say, the distance between categories one and two should be the same as the distance between two and three, and so on. This

information is often used to decide whether a step should be deleted (i.e., it doesn't really exist), or whether, perhaps, another response category might be added. In the present situation, the information can be used to help determine whether there is a smooth progression from the 0, 1, 2, 3, and 4 categories in the LI. Lack of a smooth progression would suggest some change to the scoring format.

The ASCORE program (Andrich, Sheridan, & Lyne, 1991) contains an implementation of the Multiplicative Binomial that is capable of handling data generated by the response format used in the LI. Among other things, it calculates threshold estimates for the multiple categories of each item. A section of the output from ASCORE depicting category thresholds is shown in Table 2[1].

Table 2
Threshold Estimates for Categories 0,1,2,3,4 for Items 1-5

Item (Q)	Threshold Estimates			
	1	2	3	4
PART A				
Rights (Q5)	2.435	- 1.113	0.612	- 1.935
Partner (Q7)	2.435	- 1.113	0.612	- 1.935
Instruct (Q11)	2.076	- 1.346	- 0.419	- 0.311
Expect (Q20)	2.262	- 1.396	- 0.550	- 0.316
Help (Q21)	2.520	- 1.029	- 1.458	- 0.032
PART B				
Rights (Q5)	1.639	.631	-2.271	
Partner (Q7)	3.033	- 0.761	-2.272	
Instruct (Q11)	1.196	- 0.408	- 0.788	
Expect (Q20)	1.471	- 0.733	- 0.738	
Help (Q21)	2.171	- 1.608	- 0.562	

In order to justify the use of five categories in the LI, there would have to be a monotonic increase or decrease in affectivity thresholds for the different categories. It is clear from the top half of Table 2 that this is not the case. In fact, the categories do not appear to be at all ordered. When the response categories of 0 ("not experienced") and 1 ("experienced but not stressful") are combined, the number of steps is reduced to three and the output for the same five items is as shown in the bottom half of Table 2. It is apparent that there is now an ordering which is consistent across most items. The threshold estimates make better sense when the response categories of 0 and 1 are combined, but not when they are kept separate. For this reason, all items were re-scored when calculating impact scores and the data re-analysed with a view to determining the factorial structure of the LI with this new scoring format.

Structure of LI

Exploratory factor analysis was used in the Bramston and Fogarty (1995) study to examine three different models for the structure of the SSS: a one-factor, a two-factor, and a four-factor model; all of which are mentioned in the literature as possible models

[1] We have shown just a section to conserve space.

for the stress domain. These authors concluded that the SSS certainly tapped a general stress factor (one-factor solution) and that it also tapped two correlated primary factors, one labelled General Worry, the other labelled Negative Interpersonal Experiences (two-factor solution). It is important to check the correspondence between the solutions obtained in the earlier and the present study, so the same factor analytic models were extracted for this sample using the principal axis factoring routines in SPSS. To facilitate comparison of the loadings obtained in the two studies, the figures obtained in the Bramston and Fogarty (1995) study will be shown in brackets. Table 3 shows the loadings for the one-factor and two-factor solutions.

Table 3
Factor Loadings for One and Two Factor Solutions

Item (Q)	Factor I eigen = 5.9 (5.2)	Factor I eigen = 5.9 (5.3)	Factor II eigen = 1.5 (1.3)	h^2
Rights (Q5)	.46 (.37)	.56 (.52)	-.03 (-.12)	.30 (.20)
Partner (Q7)	.01 (.35)	-.09 (.31)	.22 (.09)	.04 (.11)
Instruct (Q11)	.42 (.45)	.34 (.37)	.12 (.14)	.16 (.33)
Expect (Q20)	.45 (.44)	.52 (.48)	-.10 (.01)	.25 (.36)
Help (Q21)	.33 (.63)	.30 (.77)	.18 (-.05)	.16 (.56)
Worksup (Q16)	.24 (.39)	.28 (.43)	.00 (.00)	.08 (.20)
Helpless (Q23)	.50 (.38)	.25 (.33)	.35 (.10)	.23 (.15)
Informed (Q24)	.30 (.41)	.40 (.54)	-.02 (-.08)	.15 (.25)
Find Job (Q25)	.48 (.41)	.68 (.65)	-.20 (-.21)	.40 (.26)
Likeyou (Q31)	.41 (.46)	.38 (.46)	-.05 (.06)	.16 (.27)
Friends (Q29)	.47 (.41)	.41 (.34)	.10 (.13)	.21 (.21)
Choice (Q1)	.46 (.43)	.58 (.30)	-.03 (.20)	.32 (.21)
Privacy (Q2)	.41 (.45)	.45 (.30)	.07 (.22)	.23 (.18)
Argue (Q3)	.56 (.41)	.25 (-.01)	.46 (.52)	.36 (.22)
Treatdf (Q4)	.52 (.52)	.33 (.28)	.27 (.33)	.25 (.33)
Listen (Q9)	.56 (.43)	.37 (.21)	.35 (.30)	.34 (.17)
Bully (Q13)	.50 (.40)	.07 (.07)	.65 (.42)	.46 (.30)
Interupt (Q14)	.45 (.23)	.10 (-.11)	.45 (.40)	.25 (.10)
Tease (Q15)	.51 (.33)	.06 (-.15)	.60 (.58)	.39 (.33)
Coerce (Q17)	.59 (.50)	.46 (.08)	.22 (.54)	.33 (.27)
Fights (Q18)	.56 (.47)	.30 (-.06)	.36 (.67)	.29 (.37)
Home (Q27)	.39 (.50)	.30 (.23)	.20 (.36)	.17 (.25)
Intrub (Q28)	.45 (.46)	.00 (.21)	.60 (.33)	.36 (.24)
Crowds (Q22)	.49 (.27)	.29 (.07)	.32 (.26)	.25 (.11)
Change (Q26)	.31 (.21)	.48 (.22)	-.16 (.02)	.20 (.09)
Cantdo (Q30)	.52 (.26)	.44 (.14)	.14 (.28)	.26 (.10)
Death (Q6)	.35 (.28)	.03 (.12)	.44 (.22)	.20 (.08)
Family (Q8)	.31 (.35)	.25 (.18)	.03 (.23)	.07 (.12)
Quick (Q10)	.41 (.35)	.28 (.26)	.16 (.15)	.13 (.10)
Unstyou (Q12)	.31 (.32)	.38 (.27)	-.06 (.10)	.13 (.18)
Ignore	.24	.10	.34	.14
Upset	.11	-.10	.33	.09
		Factor Intercorrelation		
			I	
		II	.36 (.47)	

Note: Figures from Bramston and Fogarty (1995) are shown in brackets

There are many similarities between the solutions obtained from the two studies. In both cases, root one criterion indicated that 10 factors have to be extracted before the proportion of variance accounted for by each succeeding factor drops below one. The eigenvalues for the one- and two-factor solutions are also very similar, although there was more common variance in the present data set, most likely because of the altered scoring format[2]. The one-factor solution accounted for 16.8% of the variance in the earlier study; here it accounted for 18.3%. The two-factor solution accounted for 21.2% of the variance in the earlier study, here it accounted for 23.1%. There was also much similarity in the solutions obtained. The two factors extracted in the present study were clearly the same as the two identified earlier, corresponding to General Worry and Negative Interpersonal Experiences. There were some differences but the overall patterns were the same. When items with loadings above .30 were used to form two separate scales, Cronbach's alpha reliability index for the General Worry scale was .81 and for the Negative Interpersonal Experiences scale, .80. Using the same criteria, the index for the single factor scale was .85.

Given the uncertainty about the number of factors in the SSS and the minor modifications introduced in the LI, other factor models were also tried in the present study. It was considered particularly important to look for evidence of factorial solutions that corresponded with known stress dimensions, indicating subscale structures in the LI that might serve as a basis for immediate application and also guide future development of the scale. The one- and two- factor solutions given above clearly already serve this purpose, but if the LI is used only as a measure of one or two factors, then it can be pruned somewhat. Before taking this step, a three-factor solution was requested using principal axis factoring with oblique rotation. The resulting pattern matrix and factor intercorrelation matrix are shown in Table 4.

Table 4
Factor Pattern Matrix for Three Factor Exploratory Solution

Item	Factor 1 (18.3%)	Factor 2 (4.9%)	Factor 3 (3.8%)	h^2
Privacy	.58	.08	-.09	.35
Rights	.51	-.01	.12	.31
Findjob	.51	-.21	.30	.39
Likeyou	.51	.01	-.05	.24
Choice	.50	-.08	.17	.31
Help	.48	.21	-.19	.31
Friend	.47	.11	.01	.27
Informed	.45	-.03	-.05	.18
Change	.43	-.13	.11	.20
Listen	.40	.36	.03	.40
Home	.40	.20	-.10	.23
Coerce	.35	.20	.27	.36
Worksup	.25	.02	-.10	.09
Bully	-.01	.65	.19	.37
Intrub	-.07	.59	.14	.36
Tease	-.04	.56	.23	.39
Argue	.11	.43	.29	.37
Death	.12	.42	-.10	.22
Interupt	-.03	.41	.27	.26
Upset	-.03	.37	-.06	.13
Ignore	.22	.36	-.12	.21
Crowds	.19	.31	.18	.24
Partner	.09	.29	-.27	.14
Treatdf	.02	.22	.47	.31
Carntdo	.20	.06	.43	.29
Family	-.05	.01	.41	.16
Helpless	.02	.29	.41	.29
Instrct	.09	.14	.39	.23
Expect	.35	-.13	.37	.31
Fights	.08	.30	.36	.29
Unstyou	.14	-.05	.36	.17
Quick	.14	.10	.28	.15
		I	II	
Factor	II	.33		
Correlations	III	.30	.15	

As would be expected, this solution accounts for more of the common variance, although still only 27%. It is interesting to note, however, that the two factors identified in Table 3 are still present in this solution but that another factor has emerged. Items loading on this additional factor reflect concern about personal competency and we have labelled it “Coping”. Some items that load highly on it include “Do people treat you as though you are different?” (Treatdf), “Do people think you can’t do things when you think you can?” (Cantdo), “Have you ever been in a difficult situation where you didn’t know what to do?” (Helpless), “Can you understand other peoples’ instructions or directions?” (Instrct), “Can you do the things people want you to do?” (Expect), and “Can people understand you?” (Unstyou). This factor is a useful addition to the Worry and Negative Interpersonal Relations factors still present in this solution, especially because all three factors have sufficient marker items to form subscales of the LI.

When items with loadings of at least .30 were used to form three separate scales, Cronbach's alpha for the 13-item General Worry factor (I) was .80, for the 11-item Negative Interpersonal Relations scale it was .78 (the item Partner was added to this scale), and for the 10-item Coping scale alpha was .73 (Quick was added to this scale). The only item that did not form a part of one of these three scales was Worksup ("Do you get on with your work supervisor/teacher?"). This item loaded on the General Worry factor in the earlier study and showed a tendency to do so here too. These reliability coefficients suggest that there are good grounds for extracting three subscales from the LI: the new Coping scale has reasonable reliability and its extraction has only a slight impact on the reliability of the other two scales.

Testing Other Models Using Confirmatory Factor Analysis

There is no doubt that a three-factor model is supported by these data but it is also likely that other models can also be supported. Confirmatory factor analytic (CFA) procedures from the LISREL 8 (Joreskog & Sorbom, 1993) package were used to test different models. In CFA, the researcher posits an *a priori* structure and tests the ability of a solution based on this structure to fit the data by demonstrating that: a) the solution is well defined; b) the parameter estimates are consistent with theory and *a priori* predictions; and c) the χ^2 likelihood ratio and subjective indices of fit are reasonable (McDonald & Marsh, 1990). For present purposes, the Non-Normed Fit Index (NNFI) recommended by McDonald and Marsh (1990) and the Root Mean Square Error of Approximation (RMSEA) recommended by Browne and Cudeck (1993) were considered as well as the usual χ^2 measure of goodness of fit. The NNFI varies along a 0-1 continuum in which values greater than .9 are taken to reflect an acceptable fit. Browne and Cudeck suggest that an RMSEA value below .05 indicates a close fit and that values up to .08 are still acceptable.

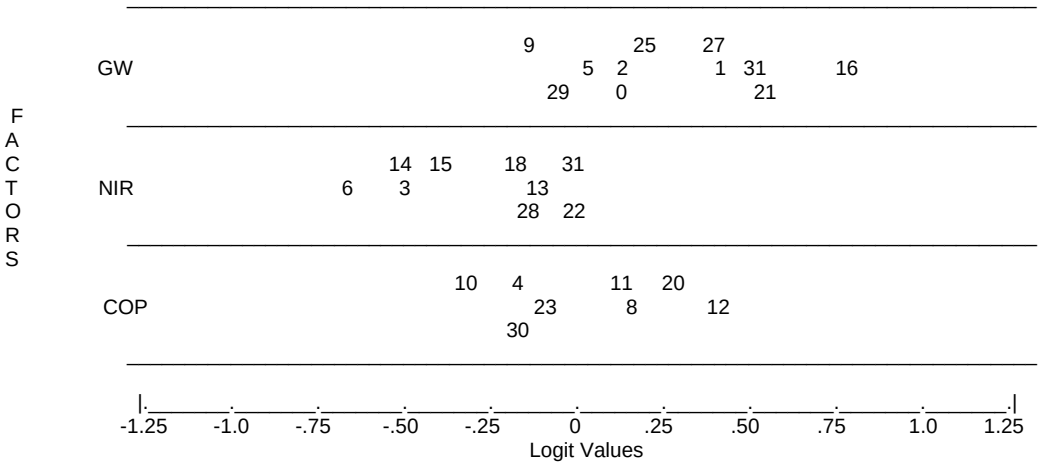
Fit indices for a two-factor solution based on the exploratory analyses shown in Table 3 were not acceptable (χ^2 (344) = 627.988, $p < .000$; RMSEA = .06; NNFI = .77). The fit statistics for the three factor model, however, were satisfactory. The Chi square value of 378.442 with 347 degrees of freedom had a probability of 0.118, the NNFI value was .96, and the RMSEA a low 0.02. The change in χ^2 compared with the three-factor model was highly significant and both other indices of fit also decreased markedly for the two-factor model. There is no doubt that the three-factor model provides a better fit to these data. The four-factor solution reported by Bramston & Fogarty (1995) could not be tested here because the slight changes introduced into the LI led to the disappearance of one of these factors. The main change was the omission of the item Restricts from the LI; this item was one of only three items that led to the emergence of the this factor in the Bramston and Fogarty four-factor solution.

One obvious further model is suggested by the factor intercorrelations obtained in Table 4. The presence of factor correlations indicates that a hierarchical model with at least one second-order factor might also be appropriate. In the present case, it was expected that a single second-order global stress factor would explain the correlations among the three first-order factors. This was indeed the case. Hierarchical analysis using LISREL showed that all three first-order factors had loadings between .81 and .84 on a single second-order factor.

Rasch Analysis of the Items in the LI

One application of Rasch analysis has already been described above; it proved useful in deciding a better scoring format for the LI. Another main use for Rasch analysis is to convert the measurement scale to a linear continuum that has a fixed zero point (origin) and equal units of measurement (logits) extending in either direction. This permits the calculation of an item characteristic curve for each item describing the probability of a person with a given amount of the trait being measured endorsing the item (see Figure 1 for examples). Location estimates are usually provided for each item, the estimate being the point on the continuum where the probability of endorsing the item is 0.5. Items that people find easy to endorse have negative location estimates, items that people have difficulty endorsing have positive location estimates. The items forming the LI scale were analysed using the ASCORE software (Andrich et al., 1991). The person separation index for these data was .73. Location estimates are shown in Figure 2.

Figure 2
Location Estimates (in logits) for Three Dimensions of the Lifestress Inventory



Key:
GW = General Worry
NIR = Negative Interpersonal Relations
COP = Coping

The items have been separated into their factor groupings to make it easier to see the areas of the broad stress continuum tapped by the three factors shown in Table 4. It can be seen that there is a tendency for the factors to cover different areas of the continuum. The most easily experienced stressors are those associated with Negative Interpersonal Relations, nearly all of which have location estimates below zero. In other words, people with mild intellectual disabilities find it easy to agree with statements that they encounter these stressors and are affected by them. The most “difficult” items, on the other hand, are associated with the General Worry factor, nearly all of which have positive location estimates. The most difficult item to endorse in this sample was

Worksup, an item that was dropped in the final factor analyses because it had a very low communality. The Coping factor, on the other hand, shares the middle space with both other factors.

To some extent, these findings could be predicted on the basis of the frequency analysis shown in Table 1: items with high endorsement rates are easily experienced, items with low endorsement rates are not easily experienced. To say that the Rasch analysis merely reflects the frequency data, however, would underestimate the sophistication of this technique. The item locations are based on an intricate mathematical analysis of the whole pattern of responses and, as a consequence, carry more information than a mere indication that a lot of participants endorsed, or failed to endorse, a particular item. The fact that an item is located, say, towards the upper end of the continuum means that a person endorsing this item is also likely to have endorsed many of the items with lower affectivity values. By implication, someone reporting stress associated with work supervision is likely to have reported many other stressors as well. In this way, the Rasch analysis provides very useful information about the relative importance of the items, and the underlying factors, in the Lifestress Inventory.

Discussion

The present paper had three broad aims. The first of these was to examine the suitability of the scoring format employed in the Lifestress Inventory. Although other stress scales use the device of asking whether a stressor has been experienced and then request the respondent to indicate the severity of the reaction, this response format differs from the Likert format developed by Thurstone (1932). In the Bramston and Fogarty (1995) paper, the data were treated as censored and uncensored, the former being a recommended treatment for scales that use the format employed in LI. The authors noted that the correlations were more robust when the data were treated as censored, but that the difference was not dramatic. In the present study, Rasch analysis was used to check the appropriateness of the 0, 1, 2, 3, & 4 response categories. It was noted that, for the calculation of impact scores, a better scoring format was achieved when the 0 and 1 response categories were combined. These categories can be kept separate when looking at the sources of stressors but should be combined when calculating impact scores.

The second, and principal, aim of the present study was to define the stress dimensions captured by the Lifestress Inventory (LI) . Earlier work with the Subjective Stress Scale (SSS), a forerunner to LI, had shown that it was possible to measure stress in people with mild intellectual disabilities and that at least some of the stress dimensions already identified in the general population can also be identified here (Bramston & Bostock, 1994, Bramston & Fogarty, 1995). The development of items for the SSS was not guided by any structural model. That is, items were not selected as exemplars of hypothesised stress dimensions; rather, items were included in the scale because they had been identified by members of the intellectually disabled population and their helpers as being potential stressors. The factors that have emerged from the analyses in this paper should therefore be stress themes that are representative of the experiences of people with intellectual disabilities and have a high degree of content validity. Some of these themes may be common across other groups and cultures and other themes may be unique to the lives of people with intellectual disabilities.

The first stress factor appears to be a General Worry dimension which taps two identifiable concerns. Several items loading on this factor deal with stress over low social support including family, friends and partner and several other items involve concern with infringement of rights such as choice, coercion, rights and privacy. The social support component is one commonly associated with most stress models and is frequently regarded as a mediator or buffer variable that helps to reduce the impact of severe stressors (Lepore, Evans & Schneider, 1992). People with intellectual disabilities are often dependent on family and support workers in various aspects of their lives and it is not surprising that social support is a key stress component. The presence of personal rights as the other component of this factor is more unique. The rights of privacy, choice, and speaking for oneself have been the subject of philosophical shifts within the disabilities field in recent years as well as in training courses offered to many people with intellectual disabilities. The majority of subjects in this study would have a very high awareness of these issues and it is not surprising to find this is a major component of their stressors. The identification of a General Worry factor within the LI is consistent with the findings of Bramston and Fogarty (1995) and with evidence for a general upset factor within the Daily Hassles Scale (Dohrenwend & Shrout, 1985) and the Perceived Stress Scale (Hewitt et al., 1992).

The second factor tapped by LI has been labelled Negative Interpersonal Experiences. This factor emerged strongly in the previous study by Bramston and Fogarty (1995) and closely resembles a factor on the DSI (Brantley & Jones, 1989) labelled 'interpersonal problems'. The Perceived Stress Scale (Cohen et al., 1983) also revealed a factor dealing, at least in part, with negative affective reactions such as anger and upset and the Inventory of College Students' Recent Life Experiences (Kohn, Lafraniere, & Gurevich, 1991) similarly found a factor dealing with negative interpersonal relationships among students. Clearly, negative relationships are a source of stress for a great many people with and without disabilities. The emergence of the same two factors reported by Bramston and Fogarty (1995) with a different sample attests to the reliability and replicability of the factor structure.

The third LI factor is labelled as Coping. Deficiencies in coping skills have long been associated with stress (Aldwin, 1994) and it is not surprising that the LI has items tapping this dimension. The Inventory of College Recent Life Experiences has a factor dealing with competency fears as does the Perceived Stress Scale and the Daily Stress Inventory. As with the previous two factors, issues that may initially have been assumed to be specific to people with intellectual disabilities have been shown to be a common element of stress in many scales. This indicates that the LI has considerable overlap with stress on other scales. This particular factor, however, did not emerge in the exploratory factor analysis of the SSS (Bramston & Fogarty, 1995) where it was subsumed under the General Worry dimension. Subsequent efforts to extract it using confirmatory procedures also proved unsuccessful. It is hard to say why it emerged in one sample but not the other. Given the fact that the population concerned is characterised by mild intellectual disability, concerns with coping might be expected to be a major source of stress. Further administrations of the LI will help to clarify the status of this factor.

In summary, the findings of this paper reveal that subjective stress as perceived by people with intellectual disabilities is not "special" but rather has many of the same themes as that reported by most other groups. Interpersonal difficulties and a lack of

confidence in one's skills appear to be an integral aspect of subjective stress no matter who is experiencing it. From a structural viewpoint, therefore, it seems that if a collection of stressors are identified for a particular population and assembled in the form of a scale, as was the case for the original SSS, it is likely that the main factors underlying the scale will belong to a small group of stress dimensions already identified in a number of populations. There may also be some unique dimensions arising from the circumstances surrounding that population, such as pupil misbehaviour for school teachers, but these are somewhat predictable and of less theoretical interest. At this stage, no such factor has emerged in our studies with people with a mild intellectual disability. These people appear to be worried by the same concerns as other people. Whether or not they are worried to the same extent cannot be judged from the present data. That question will be addressed in future work that compares the responses of different populations to the LI. This work will also test the equivalence of the factor structure of the LI for different groups in the population.

The final aim of the present study was to check the areas of the stress continuum that are covered by the LI. Rasch analysis was employed for this purpose. What we do know from the Rasch analysis of the LI is that people with intellectual disabilities find it relatively easy to endorse items that deal with Negative Interpersonal Experiences, a trend that is also reflected in the frequency data. Coping is next on the continuum, with General Worry items proving to be least problematic for this population. This suggests that programs designed to deal with stress in this population would do well to focus on the Negative Interpersonal Relations area first.

In summary, the demonstrated overlap in factor structure between the SSS and other commonly used stress scales is further support for the validity of the new scale. Why the Lifestress Inventory is uniquely important is that, while measuring much the same construct as other stress scales, it has items which deal with events and issues which are immediately relevant to people with mild and moderate intellectual disabilities and is worded in language most of them comprehend. It is envisaged that future research will refine the wording of some LI items, set out standardised prompts to follow each question and possibly change the five items which were identified as not contributing to the scale in this or the study by Bramston and Fogarty (1995). A possible option is to trial some expansions of the LI, this time using theoretical models of stress in the general population as the basis for selection of additional items, with a view to testing for the responsiveness of this population to other dimensions of stress. When this happens it is likely that the revised version will include a greater number of subscales. This would improve the clinical utility of the LI where people with intellectual disabilities are facing major or multiple stressors in their lives. A better understanding of what they are experiencing will assist in the provision of support and in the development of stress management programs.

A further aim of the continuing research programme will be to begin making comparisons of LI response patterns for different populations. The early research with the SSS/LI has shown that stress can be measured in the mildly intellectually disabilityped population and that recognisable stress dimensions are tapped by the inventory. Some futher exploratory work is needed on the question of dimensionality but it is now equally important to start making comparisons across populations. That is, to start comparing endorsement rates for the items in the LI. It will be interesting to see, for

example, whether the frequency data in Table 1 will be similar for a sample drawn from the general adult population or whether there will be reliable differences in endorsement rates for some items. The LI, although designed with a particular population in mind, is quite suitable for adminstration to other populations. The information gained from these comparisons will prove very helpful for those working with mildly intellectually disabilityped persons.

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