Self-Concept: Multidimensional or multi-faceted, unidimensional?

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The study aimed to test the psychometric properties, conceptual design and unidimensionality of a multi-faceted, hierarchical model of self-concept using the Extended Logistic Model of Rasch. The multi-faceted hierarchical model contained three 1st order facets, each composed of three 2nd order facets. Academic self-concept consists of Capability, Perceptions of Achievement and Confidence in academic life: Social self-concept consists of Same-sex peer, Opposite-sex peer and Family self-concept: Presentation of self consists of Physical, Personal confidence and Honest/trustworthy self-concept. Items were taken from other scales and modified to suit Australian university students. The proportion of observed variance considered true was 0.941. The results supported the multi-faceted, hierarchical model of Self-concept as a unidimensional latent trait involving two aspects (How I would like to be *and* How I actually am), *with the former being easier than the latter for each corresponding item.*

Introduction

Shavelson, Hubner and Stanton (1976) reviewed the literature and proposed a multi-faceted, hierarchical model of self-concept. They proposed a halt on self-concept scale development until the structure of self-concept could be elucidated. They suggested that general self-concept was composed of four 1st order facets: academic self-concept, social self-concept, emotional self-concept and physical self-concept. The 1st order facets are composed of 2nd order facets. Academic self-concept has aspects relating to each of the academic areas of English, History, Math and Science. Social self-concept is composed of peer self-concept and significant others self-concept. Emotional self-concept is composed of self-concept for particular emotional states. Physical self-concept is composed of physical ability self-concept and physical appearance self-concept.

The theory relating to this structure is that students' behaviours, abilities and personalities lead to self-concepts about Maths, English, physical appearance, relationships and so on. These are reinforced or changed as a result of comments and acceptance from peers and significant-

others (parents, teachers and role models), and self-reflections. Self-concepts relating to the 2nd order facets lead to self-concepts of 1st order facets and then to a general self-concept. According to Marsh (1990, p.27, cited in Bracken, 1996), self-concept is a 'person's perceptions regarding himself or herself; these perceptions are formed through experience with and interpretations of one's environment. They are especially influenced by evaluations by significant others, reinforcements, and attributions for one's own behaviour.'

According to Hattie (1992, p.117), self-concept is 'both a structure and a structure/process'. This means that, for some people, it is a 'set of beliefs that dominate processes and actions' and guide behaviour across situations. It also means that, for other people, it is a latent, 'hierarchical and multi-faceted set of beliefs that mediate and regulate behaviour in various social settings'. 'Self-concept relates to descriptions, expectations and prescriptions and can be actual, possible, ideal, evaluative, interpretative, and dynamic.' It is noted here that the models of self-concept formation do not preclude 'ideal' and 'actual' self-concepts from contributing differentially to self-concept. However, the main self-concept scales only include 'real' self-concept because it is claimed that 'ideal' self-concepts do not provide any more explanatory power than 'real' self-concepts (Marsh & Hattie, 1996).

According to Bracken (1992, p.10), self-concept is 'a multidimensional and context-dependent learned behavioural pattern that reflects an individual's evaluation of past behaviours and experiences, influences an individual's current behaviours, and predicts an individual's future behaviours.' Bracken (1992) uses a Multidimensional Self Concept Scale comprising 150 self-report items with a Likert format. There are six domains each composed of 25 item sub-scales relating to social, competence, affect, family, physical and academic self-concept. Evidence is presented, using traditional measurement techniques, for various aspects of validity and reliability of this scale, with data representative of the 1990 USA Census by gender, race, ethnicity and geographic region.

Marsh has published extensively on self-concept for about 20 years and has developed a number of scales and a vast amount of evidence relating to self-concept. The Self Description Questionnaires (I for preadolescents, Marsh, 1992a, 1988; II for adolescents, Marsh, 1992b, 1990; and III for late-adolescents, Marsh, 1992c; Marsh & O'Neill, 1984) are based on, or extended from, the Shavelson, Hubner and Stanton (1976) model. The Self Description Questionnaire II for adolescents consists of a general-self scale and ten sub-scales (102 items). There are four non-academic sub-scales relating to physical abilities, physical appearance, same-sex peer relations, opposite-sex peer relations, parent relations, emotional stability and

honesty/truthfulness, and three academic sub-scales relating to reading, mathematics and general school. Each sub-scale contains eight or ten items in six response categories: false, mostly false, more false than true, more true than false, mostly true, and true.

The evidence, based on the traditional technique of factor analysis and the finding of low inter-correlations between the dimensions, leads to a view, widely propagated in the journal and book literature, that self-concept is multidimensional and hierarchical (Bracken, 1996, 1992; Bryne, 1984; Byrne & Worth Gavin, 1996; Hattie, 1992; Marsh & Shavelson, 1985; Marsh, 1994, 1993, 1990a,b; Marsh & Roche, 1996; Marsh & Yeung, 1997).

Problems with a Multidimensional Self-concept Latent Trait

Self-concept is a latent trait. It is not directly observable. If the theory of self-concept formation (as explained here) is basically correct, then the dimensions can be ordered along a self-concept continuum from easy to hard. It is hard to imagine that the theory isn't basically correct. There will be items that most students will agree are easy (most will obtain a high score on them) and there will be items that most students will agree are hard (only those with high self-concepts will agree with them). Just because there are low correlations between dimensions doesn't mean that they cannot be ordered along a continuum from easy to hard. The low correlations are commonly obtained between total academic self-concept sub-scale scores and total non-academic self-concept sub-scale scores on the Self Description Questionnaires, as for example between Social self-concept and Physical self-concept. This is not surprising, considering the methods used. As a result of these, Marsh suggests that users should only analyse specific self-concept areas (such as academic, social or physical), rather than all self-concept dimensions together (Marsh, 1990, cited in Bracken, 1996 p.146).

What then is wrong with the traditional measurement procedures used? There is nothing wrong. The answer depends on how the results are interpreted and the literature interpretation points to two problems. First, factor analysis doesn't use a proper scale in which items or factors are ordered from easy to hard. Scores are simply added, as in a Maths test, to provide a total score and items are checked to see that they 'load' on the same sub-aspect (factor). No check is made to link the data of any sub-aspects together. This produces only a ranking score, not a proper scale and yet it is interpreted as a scale. Second, item difficulties and student self-concept scores are not calibrated on the same scale. Actually, no calibrations are performed in factor analysis and correlations to form any 'scale' involving both student scores and item difficulties. Hence, contrary to the interpretation in the literature, the factor analysis and low inter-

dimension correlations are not evidence against a unidimensional self-concept latent trait.

In contradiction of self-concept theory, there is a widely propagated view that 'ideal' self-concept is not important and does not contribute to self-concept; only 'actual' or 'real' self-concept is important. Marsh and Hattie (1996, p.77) wrote that 'ideal ratings typically do not contribute beyond what can be explained by actual ratings alone, and mean discrepancy scores have no more and, perhaps, less explanatory power than the mean of actual ratings'. It is difficult to reconcile the theory with the view that 'ideal' self-concept does not have much explanatory power. Contrary to this claim, it is quite clear that an 'ideal' or *How I would like to be* mode must have a reasonably strong explanatory power in self-concept formation. The massive exposure of role models, across many sports and occupations through television, must influence student views of what they could be like and, therefore, how they would like to be, as well as their own view of how they are. Peer and significant-other influence is stressed in the main model of self-concept formation and this will impact as well on 'ideal' self-concept. It is very hard indeed to imagine that these parts of the model are not basically correct. Hence, it is more likely that the traditional measurement results are being interpreted wrongly.

Problems with the Current Measures of Self-concept

Four aspects of the main measures of self-concept (Bracken, 1996, 1992; Song & Hattie, cited in Hattie, 1992, p.84, and Marsh, 1992a,b,c) are called into question. First, students are asked to respond to items in a Likert format (strongly disagree to strongly agree). This response format contains a discontinuity between the disagree and agree response categories. That is, the response measurement format is not ordered from low to high and those who are undecided, don't want to answer, are unclear or just neutral, will answer the middle (neutral) category. If a neutral category is not provided, they will be forced to answer either agree or disagree. This means there is a consequent measurement problem. Two, only ordinal level scales were used in these studies (numbers were just added to form a total score) and no check was made to reject items and data that are not all linked together. Factor analysis places items and data in factors, but with no requirement that the factors should be linked. Thus the items and the self-concept measures were not calibrated on the same interval level scale. Modern measurement programs are now available to create interval level measures in which item difficulties and person self-concept measures can be calibrated on the same scale. Then equal differences between item scores would represent equal amounts of self-concept. (This is a consequence of the logic of the mathematics in Rasch modelling). Rasch modelling would test the

multi-faceted structure of self-concept and its dimensional nature (see Andrich, 1988a, 1988b; Andrich, Sheridan, Lyne & Luo, 1998; Rasch, 1980/1960; Waugh, 1999, 1998). Three, the self-concept items are not always separated into their sub-scales on the questionnaires, so that it is not clear to the respondents what is being measured. Four, positively and negatively worded items are mixed to avoid the fixed response syndrome (a common procedure in traditional measurement). There is some evidence that this causes an interaction effect between items in modern measurement models (see Andrich & van Schoubroeck, 1989). Consequently, it is considered better to word all items in a positive sense when using modern measurement models.

Changes Made

A multi-faceted hierarchical self-concept scale was developed to overcome the four measurement problems referred to above. Seven sub-scales relating to Capability, Perceptions of achievement, Confidence in academic life, Relationships with peers and family, Personal confidence and Physical self-concepts were used in the new design (on the basis of evidence provided by Bracken (1996), Hattie (1992), Marsh (1992a, 1992b) and Marsh and Hattie (1996). An eighth sub-scale was added (Honest/trustworthy self-concept) and the peer sub-scale was divided into two, one for Same-sex peers and the other for Opposite-sex peers (on the basis of evidence provided by Marsh, 1990, 1994). The original 35 items from Song and Hattie (1992) were revised and adapted to apply to Australian university students. They were rewritten in a positive sense, so as to be applicable to the new response format and pretested with 12 students. Other items from existing scales were adapted and revised for each of the Opposite-sex peer, Same-sex peer and Honest/trustworthy sub-scales. The items were ordered under their respective sub-scale headings which makes it clear to the respondents what sub-scale is being measured. The response format was changed in two ways. First, two columns were added for responses, one for *How I would like to be* and another for *How I actually am*. Second, the response categories were changed to an ordered format to provide a better measurement structure: *all the time or nearly all the time, most of the time, some of the time*, and *none of the time or almost none of the time*. There are now 45 items relating to *How I would like to be* and, in direct correspondence, 45 items relating to *How I actually am* (see Appendix A). The data were analysed with a modern Rasch measurement model program (Andrich, Sheridan, Lyne & Luo, 1998) to create a unidimensional scale of self-concept and test the conceptual model of self-concept.

Conceptual Framework of s Self-concept

It is proposed that there is a Self-concept latent trait for adolescents. The trait is postulated to consist of three 1st order facets: Academic self-concept, Social self-concept and Presentation of self. Each 1st order facet is composed of three 2nd order facets. These are Capability, Perceptions of achievement and Confidence in academic life for Academic self-concept; Same-sex peer, Opposite-sex peer and Family for social self-concept; and Physical, Personal confidence and Honest/trustworthy for Presentation self-concept. It is postulated that the 1st order facets can be ordered by difficulty along a single continuum. Social self-concept is expected to be the easiest 1st order self-concept to achieve most of the time, then Presentation of self and Academic self-concept is expected to be the hardest to achieve most of the time. It is expected that for each item of each facet, *How I would like to be* will be located at an easier position on the scale than its corresponding item for *How I actually am*, for most adolescents.

The self-concept trait is expected to have been moulded from experiences with the environment and from self-reflections, as adolescents experience life at home, at school and in the community. The trait is influenced by the evaluations of significant-others, conveyed to them by both positive and negative reinforcements of their perceptions of themselves, and by comparison with others. It is also influenced by their own evaluations of their self-evaluations and the attributions they ascribe for their own behaviour.

Aims

There are three aims for the present study. The first is to create an interval level scale from the multi-faceted hierarchical self-concept model for adolescents. The second is to analyse its psychometric properties using a modern measurement model, the Extended Logistic Model of Rasch (Andrich, 1988a, 1988b; Rasch, 1980), and the third is to investigate its unidimensionality and structure.

Questioning the Rasch Approach

The Rasch approach rejects items that do not fit the measurement criteria (thus increasing scale unidimensionality) but, because there will then be a different number of *How I would like to be* and *How I actually am* items, it may be claimed that there is a loss of validity. The usual approach is to have a set of 'idealistic' self-concept items and then compare the answers on the same set of 'realistic' items. This approach assumes that all the idealistic and realistic items contribute to self-concept (are content valid), but makes no check on whether they are contributing together to the formation of the

trait. It assumes that if an 'idealistic' item contributes to self-concept, then its corresponding 'realistic' item contributes too, and *vice-versa*, without providing any evidence for it. If the 'ideal' and 'real' aspects are highly related, an assumption is made that 'ideal' doesn't provide any more explanatory power or it is due to a common factor. The counter claim is that there is an increase in validity and unidimensionality. The approach taken in this study is to only use items that contribute to an interval level scale where items measuring both *How I would like to be* and *How I actually am* are calibrated on the same scale from easy to hard and fit the measurement criteria together. This means that they may contribute differentially to the scale, in line with the theory of self-concept formation.

Not all measurement researchers accept the Rasch model as valid (see Divgi, 1986; Goldstein, 1980; Traub, 1983). Whether the researcher should choose a model that fits the data or use the requirements of measurement to model the data (Andrich, 1989) has also been questioned. The Rasch model uses the latter approach. It requires the researcher to define a continuum (from less to more) and use statistical measurement criteria to check on the consistency of the person measures and the item difficulties (Wright, 1985; Wright & Masters, 1981). A scale then has to be created in which the property of additivity for item difficulties is valid (Wright, 1985) and the scale values of the statements are not affected by the opinions of people who help to construct it.

Sample and Administration

The sample consisted of 243 first year students selected through special entry programmes at an Australian University and is basically a convenience sample. There are 94 (39%) from SchoolSelect (where schools nominate students to attend university), 52 (21%) selected through UniStart Plus (fee-paying students who did not do sufficiently well in Tertiary Entrance Examinations for direct entry) and 97 (40%) selected through UniOps (where students were interviewed by university staff after application). After ethics committee approval, the questionnaires were posted to students and a follow-up was conducted. For SchoolSelect, the response rate was 94/149 (63%), for UniStart Plus 52/60 (87%) and UniOps 97/280 (35%). Generally, the questionnaires took 15–20 minutes to complete.

Measurement Model

The Extended Logistic Model of Rasch (Andrich, 1988a, 1988b; Rasch, 1980/1960) is used with the computer program Rasch Unidimensional Measurement Models (RUMM) (Andrich, Sheridan, Lyne & Luo, 1998) to analyse the data. This model unifies the Thurstone goal of item scaling with extended response categories for items, which are applicable to this study.

Item difficulties and person measures are calibrated on the same scale. Items are ordered from easy to hard on the scale such that easy items are answered positively by most students and hard items are only answered positively by students with a high self-concept. Thus all item data have to contribute in a consistent way and there has to be good agreement amongst students as to the item locations, for a good scale. The Rasch method produces scale-free person measures and sample-free item difficulties (Andrich, 1988b; Wright & Masters, 1982). That is, the differences between pairs of person measures and pairs of item difficulties are expected to be sample independent.

The zero point on the scale does not represent zero self-concept. It is an artificial point representing the mean of the item difficulties, calibrated to be zero. It is possible to calibrate a true zero point, if it can be shown that an item represents zero self-concept. There is no true zero point in the present study.

The RUMM program (1998) parameterizes an ordered threshold structure, corresponding with the ordered response categories of the items. The thresholds are boundaries located between the response categories and are related to the change in probability of responses occurring in the two categories separated by the threshold. A special feature of this version of the RUMM program is that the thresholds are re-parameterized to create an ordered set of parameters which are directly related to the Guttman principal components. With four categories, three item parameters are estimated: location or difficulty (δ), scale (θ) and skewness (η). The location specifies the average difficulty of the item on the measurement continuum. The scale specifies the average spread of the thresholds of an item on the measurement continuum. The scale defines the unit of measurement for the item and, ideally, all items constituting the measure should have the same scale value. The skewness specifies the degree of modality associated with the responses across the item categories.

The RUMM program substitutes the parameter estimates back into the model and examines the difference between the expected values predicted from the model and the observed values using two tests of fit: one is the item-trait interaction and the second is the item-person interaction.

The item-trait test-of-fit (a chi-square) examines the consistency of the item parameters across the person measures for each item. Data are combined across all items to give an overall test-of-fit that shows the collective agreement for all item difficulties across persons of differing self-concept. This is a necessary measurement criterion to show that item difficulties are stable.

The item-person test-of-fit examines both the response patterns of persons across items and for items across persons. It examines the residual

between the expected estimate and the actual values for each person-item summed over all items for each person and summed over all persons for each item. The fit statistics approximate a distribution with a mean near zero and a standard deviation near one, when the data fit the measurement model. Negative values indicate a response pattern that fits the model too closely (probably because response dependencies are present, see Andrich, 1985). Positive values indicate a poor fit to the model, probably because other measures ('noise') are present or because there is disagreement amongst the students as to the location (difficulty) of some items on the scale.

Results

The results are set out in Figure 1, two Tables and two Appendices. Figure 1 shows the graph of self-concept measures for the 243 students and the difficulties of the 65 items, on the same scale in logits. Table I gives a summary of the fit statistics for the 65 item scale. Table II shows a summary of the mean item difficulties for the 1st and 2nd order facets of the 65 item scale. Appendix A shows the questionnaire items and their difficulties for the 65 item scale. Appendix B shows the item locations, their standard errors, the item residuals and fit to the model for the 65 items.

TABLE I

Summary data of the fit statistics to the model
for the 65 item Self-concept scale (N = 243)

	90 ITEMS		65 ITEMS
Non-fitting items	25		none
Disordered thresholds	19		none
Index of Person Separation	n/a		0.941
Item difficulties	Mean Sdμ	n/a	0.000 0.946
Person scores	Mean Sd	n/a	2.085 1.054
Item-trait interaction	n/a		446 ($p<0.005$))
Item fit statisticμ	mean Sd	n/a	-0.161 +1.008
Person fit stat.	mean Sd	n/a	-0.375 +1.505
Power of test-of-fit	n/a		excellent

Notes on Table I

1. The Index of Person Separation is the proportion of observed variance that is considered true.

2. The item and person fit statistics approximate a distribution with a mean near zero and a standard deviation near one when the data fit the model.
3. The item-trait interaction test is a chi-square. The results indicate that there is good collective agreement for all items across students of differing self-concept.
4. The mean item difficulties are calibrated to zero.
5. The scale scores are in logits (the log odds of answering positively).

TABLE II

Mean difficulties for the 1st and 2nd order facets in the 65 item Self-concept scale (N=243)

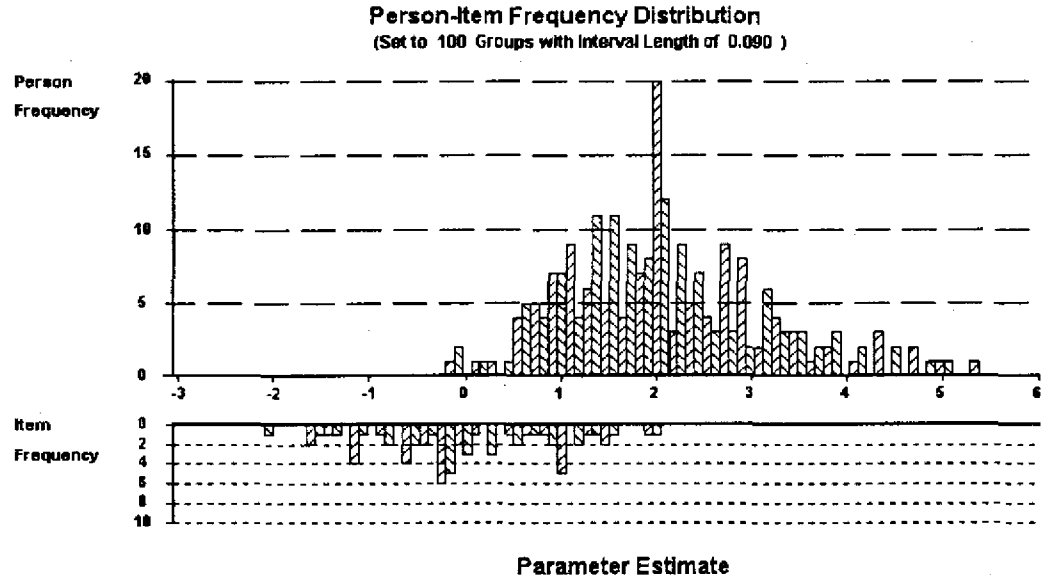
	How I would like to be	How I actually am
Social self-concept (1st)	**-0.555**	**+0.170**
Family self-concept (2nd)	-1.627	+0.370
Same-sex peer (2nd)	-0.506	-0.020
Opposite-sex peer (2nd)	-0.262	+0.308
Presentation of self (1st)	**-1.152**	**+0.279**
Physical self-concept (2nd)	-0.620	+1.187
Personal confidence (2nd)	-1.466	+0.196
Honest/trustworthy (2nd)	-2.023	-0.793
Academic self-concept (1st)	**-0.555**	**+1.009**
Capability (2nd)	-0.912	+0.270
Confidence in academic life	-0.425	+1.127
Perceptions of achievement(2nd)	-0.372	+1.274

Notes on Table II

1. The *How I would like to be* mean difficulty scores are lower than the *How I actually am* mean difficulty scores, for the 1st order facets, meaning that the it is easier to have a high score on the former than the latter.
2. The *How I would like to be* mean difficulty scores are lower than the *How I actually am* mean difficulty scores, for the 2nd order facets, meaning that it is easier to have a high score on the former than the latter.
3. The mean difficulty scores for the 1st order facets in the *How I actually am* mode are ordered from Social to Presentation to Academic self-concept, meaning that it is easiest to have a high Social self-concept and hardest to have a high Academic self-concept.
4. The mean difficulty scores for the 1st order facets in the *How I would like to be* mode are ordered, meaning that it is easier to like to have a high Presentation self-concept than to have a high Academic self-concept.

Figure 1

Graph of Item Difficulties and Student Self-Concept Scores on the Same Scale in Logits.



Notes

1. The items are not as well targeted at the student scores as they could be. They are a little easy and some harder items are needed to better target those students with high self-concepts.
2. The item difficulties and the student measures are calibrated on the same scale, an advantage over traditional measures.
3. The scale is in logits, the log odds of answering positively, and is at the interval level. That is, equal differences between the item difficulties represent equal differences between amounts of self-concept. This is a consequence of the mathematics of the measurement model.

Psychometric Characteristics of the Self-Concept Scale

The 65 items relating to *How I actually am* and *How I would like to be* have a good fit to the measurement model. The item threshold values (not included here) are ordered from low to high, indicating that the students have answered consistently and logically with the ordered response format used. The Index of Person Separability is 0.941 (see Table I). This means that the proportion of observed variance considered true is 94 per cent. The item-trait tests-of-fit indicate that the values of the item difficulties are strongly consistent across the range of student measures. The item-student tests-of-fit (see Table I) indicate that there is good consistency of student and item response patterns. These data indicate that the errors are small and that the power of the tests-of-fit are excellent.

However, there is one minor problem area and this involves targeting. The items are not as well targeted against the student measures in this

sample as they could be. That is, the students found the self-concept scale to be a little easy and some harder items should be added with difficulty scale values that correspond more closely to the scale values of those with high self-concepts (see Figure 1).

Meaning of the Self-Concept Scale

The 65 items that make up the variable Self-Concept are conceptualised as corresponding items in *How I would like to be* (27 items) and *How I actually am* (38 items), from three 1st order facets and three 2nd order facets. The three 1st order facets, Academic self-concept, Social self-concept and Self-concept of self-presentation of self, are confirmed as contributing to the variable. Their corresponding 2nd order facets: Capability, Self perceptions of achievement and Confidence in academic life (for Academic self-concept); Same-sex, peer self-concept, Opposite-sex peer self-concept and Family self-concept (for Social self-concept); and Physical self-concept, Personal self-concept and Honest/trustworthy self-concept (for Self-concept of self-presentation) are also confirmed as contributing to the variable. The 65 items used to measure these facets define the variable (see Appendix A). They have good content validity and they are derived from a conceptual framework based on a multi-faceted, hierarchical model. The facets were ordered from easy to hard along a single continuum (see Table II). The student measures and the item difficulties were calibrated on the same continuum. All this is clear evidence for a unidimensional rather than a multidimensional scale. While the difficulties of the various items within each 1st order facet vary, their mean values and order are presented in Table II. This, together with the data relating to reliability and fit to the measurement model, is strong evidence for the construct validity of the variable. This means that the student responses to the 65 items are related sufficiently well to represent the variable Self-concept as a unidimensional latent trait.

The scale is created at the interval level of measurement with no true zero point of item difficulty or student self-concept. Equal distances on the scale between measures of self-concept correspond to equal differences between the item difficulties on the scale. Items at the easy end of the scale (for example 83,51,79,77,71) are answered in agreement by nearly all the students. Items at the hard end of the scale (for example 20,84,68,66,30) are only answered in agreement by those students who have high positive self-concepts.

The 27 *How I would like to be* items are mostly towards the easy end of the scale (see Appendix A). This means, for example, that nearly all the students found it easy to say that they would like to be honest, to be treated fairly by their families, to be a worthwhile person, to have respect

for themselves, and to have confidence in themselves. The *How I would like to be* items are all easier than their corresponding *How I actually am* items. For example, students found it easier to say that they would like to be honest than that they are actually honest. They found it easier to say that they would like to be treated fairly by their families than that they are treated fairly. They found it easier to say that they would like to have respect for themselves than that they do actually have respect for themselves. They found it easier to say that they would like to have confidence in themselves than that they do have confidence in themselves. This was expected and it was part of the conceptual design of the variable, in line with the model of self-concept formation.

The 38 *How I actually am* items are mostly towards the hard end of the scale (see Appendix A). This means, for example, that nearly all the students found it hard to say that they are achieving at a high level in academic work, that they are honest persons, that others like their physical appearance, that they are of good body appearance, and that they are sure of themselves in academic classes. The *How I actually am* items are all harder than their corresponding *How I would like to be* items. Thus, students found it harder to say that others actually like their physical appearance than that they would like others to like their physical appearance. They found it harder to say that they are of good body appearance than they would like to be of good body appearance. They found it harder to say that they are sure of themselves in academic classes than that they would like to be sure of themselves in academic classes. This was expected and it was part of the conceptual design of the variable, in line with the model of self-concept formation.

Discussion

The analysis supports the conceptual design of self-concept as based on a multi-faceted, hierarchical and unidimensional model. That is, it supports the view that self-concept is based on an ordered line of three 1st order facets (see Table II). Each of these 1st order facets is based on three 2nd order facets, as previously stated. In line with this, the analysis supports the view that self-concept can be measured and used as a unidimensional variable. This stands in contrast to claims, using traditional measurement techniques, that because self-concept sub-scales are not strongly correlated, they should only be used separately (Marsh, 1990, cited in Bracken, 1996 p.146).

The analysis supports the view that self-concept is composed of an *How I would like to be* component as well as an *How I actually am* component, such that the *How I would like to be* items are easier than their corresponding *How I actually am* items. While 38 of the *How I actually am*

items contribute to the scale, only 27 of the corresponding *How I would like to be* items contribute. That is, once the items that do not fit the measurement model are deleted, the *How I would like to be* items make a different contribution to the measure of self-concept than the *How I actually am* items. This is perfectly reasonable and, while it is permitted in the model of self-concept formation, it now needs to be explicitly stated. This stands in contrast to claims, using traditional measurement techniques, that 'ideal' ratings of self-concept do not contribute anything over and above 'actual' ratings of self-concept (Marsh & Hattie, 1996, p.77). In the traditional procedure, one usually has a set of 'ideal' items and the same set of 'actual' items to measure self-concept. If the 'ideal' and 'actual' scores are strongly or moderately correlated, then the 'ideal' ratings do not contribute anything over and above actual ratings. However, this study shows that the reason for this result arises from the use of an inappropriate measuring scale for self-concept in which all items are used, irrespective of whether, together, they are fit the measurement criteria to form a scale of a latent trait.

Implications

The study has implications for the theory of self-concept formation and for the measurement of self-concept. The results suggest two new aspects. The first is that an *How I would like to be* mode should be explicitly added to the theory of self-concept formation to complement the *How I actually am* mode, such that the *How I would like to be* mode and items are easier than their corresponding *How I actually am* mode and items. The second is that self-concept can be represented as a unidimensional latent trait, in line with the theory. (It doesn't have to be multidimensional). The trait is composed of 1st and 2nd order facets that are ordered from easy to hard. An implication for further research is that Rasch modelling of the multi-faceted, hierarchical, unidimensional model of self-concept should be replicated with other samples (and include an artistic component on the basis of recent evidence provided by Marsh and Roche, 1996).

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APPENDIX A

SELF-CONCEPT QUESTIONNAIRE AND ITEM DIFFICULTIES

Please rate the 90 statements according to the following response format and place a number corresponding to **how you would like to be** and **how you believe that you actually are** on the appropriate line opposite each statement:

All the time or nearly all the time	put 3
Most of the time	put 2
Some of the time	put 1
None of the time or almost none of the time	put 0

Example
If your self-concept, **how you would like to be**, is to have the ability to obtain good grades (marks) at university all the time, put 3 and if you can only obtain good grades (marks) **some of the time**, put 1.
Item 1/2 Capable of obtaining good grades (marks) 3 1

Item No.	Item wording	How I would like to be	How I actually am
Sub-Scale: Academic self-concept (30 items)			
Capability			
1/2	Capable of obtaining good grades (marks) at university.	-1.120	+0.048
3/4	Smart enough to cope with university work.	-1.169	-0.144
5/6	Proud of my ability in academic work at university.	No fit	+1.021
7/8	Feeling good about my academic work at university	-0.447	+0.851
9/10	Able to get the results I would like at university.	No fit	+1.349
Perceptions of achievement			
11/12	Feeling good about my assignment marks (grades) at university.	-0.625	+0.965
13/14	Proud of my achievements at university.	-0.206	+1.049
15/16	Satisfied with my academic work at university.	No fit	+1.195
17/18	Happy with the academic work I do at university.	-0.286	+1.206
19/20	Achieving at a high level at university.	No fit	+1.956
Confidence in academic life			
21/22	Feeling as good as the other people in my classes at university.	No fit	+1.244
23/24	Feeling involved in academic life at university.	-0.225	+1.012
25/26	Having a rapport with lecturers at university.	-0.428	+1.043
27/28	Feeling good in university classes.	-0.532	+0.909
29/30	Sure of myself at university	-0.515	+1.429
Sub-Scale: Social self-concept (30 items)			
Same-sex peer self-concept			
31/32	Having persons of my age and sex enjoy my company.	No fit	-0.040
33/34	Having my same-sex friends have confidence in me.	-0.618	+0.238
35/36	Popular with others of the same-sex and age.	-0.019	+0.572
37/38	Able to get along well with others of the same sex.	-1.087	-0.653
39/40	An important person to my same-sex friends.	-0.300	+0.261
Opposite-sex peer self-concept			
41/42	Having persons of my age and opposite-sex enjoy my company.	-0.623	+0.134

43/44	Having my opposite-sex friends have confidence in me.	No fit	No fit
45/46	Popular with others of the same age and opposite-sex.	-0.020	+0.651
47/48	Able to get along well with others of opposite-sex.	No fit	-0.271
49/50	An important person to my opposite-sex friends.	-0.143	+0.717
Family self-concept			
51/52	Treated fairly by my family.	-1.627	+0.242
53/54	Trusted by my family.	No fit	No fit
55/56	Loved by my family.	No fit	No fit
57/58	Knowing my family is proud of me.	No fit	+0.497
59/60	Feeling wanted at home.	No fit	No fit
Sub-Scale: Presentation of self (30 items)			
Physical self-concept			
61/62	An attractive person.	-0.787	+1.565
63/64	Just as nice as I should be.	-1.194	-0.170
65/66	Of good physical body appearance.	-0.796	+1.488
67/68	Feeling that others like my physical appearance.	+0.298	+1.863
69/70	Not wanting to change anything about myself.	No fit	No fit
Personal confidence self-concept			
71/72	Confident in myself.	-1.404	+0.592
73/74	A cheerful person.	No fit	-0.035
75/76	Satisfied with myself.	-1.314	+0.927
77/78	Having respect for myself.	-1.524	-0.192
79/80	A worthwhile person.	-1.623	-0.310
Sub-Scale: Honest/trustworthy self-concept			
81/82	A trustworthy person.	No fit	No fit
83/84	An honest person.	-2.023	-0.912
85/86	Someone on whom my family can rely.	No fit	No fit
87/88	Someone on whom my friends can rely.	No fit	-1.171
89/90	A person valued by others.	No fit	-0.295

Notes on Appendix A

1. The first and second columns give the item difficulties.
2. The item difficulties are in logits, the log odds of answering positively. The lower the score, the easier the item.

APPENDIX B

LOCATION (ITEM DIFFICULTIES), ERRORS, RESIDUALS AND PROBABILITIES FOR THE 65 ITEM SCALE OF SELF-CONCEPT.

Label	Location	SE	Residual	ChiSq	Probab
Ex071 I071	-1.404	0.18	0.067	0.282	0.962
Ex017 I017	-0.286	0.13	0.038	0.289	0.961
Ex027 I027	-0.532	0.13	-0.132	0.395	0.939
Ex062 I062	1.565	0.11	0.353	0.510	0.914
Ex028 I028	0.909	0.11	-0.436	0.558	0.903
Ex035 I035	-0.019	0.12	-0.828	0.598	0.894
Ex064 I064	-0.170	0.12	0.249	0.632	0.886
Ex074 I074	-0.035	0.11	-0.071	0.699	0.869
Ex063 I063	-1.194	0.16	0.137	0.757	0.855
Ex020 I020	1.956	0.11	-0.673	0.852	0.832
Ex006 I006	1.021	0.10	0.639	0.909	0.818
Ex013 I013	-0.206	0.13	0.800	0.955	0.806
Ex030 I030	1.429	0.11	-0.490	1.175	0.752
Ex014 I014	1.049	0.11	-0.673	1.239	0.736
Ex039 I039	-0.300	0.12	-0.253	1.349	0.709
Ex018 I018	1.206	0.10	-0.863	1.406	0.695
Ex038 I038	-0.653	0.12	-1.071	1.562	0.658
Ex011 I011	-0.625	0.15	0.236	1.574	0.655
Ex002 I002	0.048	0.11	0.619	1.807	0.601
Ex008 I008	0.851	0.11	0.185	1.832	0.596
Ex029 I029	-0.515	0.14	0.476	1.842	0.594
Ex040 I040	0.261	0.10	0.177	1.843	0.593
Ex072 I072	0.592	0.10	0.975	2.069	0.545
Ex042 I042	0.134	0.10	-1.423	2.243	0.509
Ex003 I003	-1.169	0.16	-0.347	2.262	0.505
Ex076 I076	0.927	0.10	0.185	2.299	0.498
Ex068 I068	1.863	0.10	-0.116	2.425	0.473
Ex084 I084	-0.912	0.13	0.113	2.445	0.469
Ex036 I036	0.572	0.10	-1.573	2.513	0.457
Ex037 I037	-1.087	0.16	-1.111	2.624	0.437
Ex041 I041	-0.623	0.14	-1.464	2.721	0.419
Ex024 I024	1.012	0.11	-1.046	2.752	0.414
Ex049 I049	-0.143	0.12	-1.593	2.826	0.401
Ex032 I032	-0.040	0.11	-0.266	3.019	0.370
Ex001 I001	-1.120	0.17	-0.126	3.035	0.367
Ex045 I045	-0.020	0.12	-1.273	3.154	0.349
Ex023 I023	-0.225	0.12	-1.334	3.160	0.348
Ex079 I079	-1.623	0.20	-1.559	3.596	0.287
Ex033 I033	-0.618	0.14	-0.520	3.840	0.257
Ex016 I016	1.195	0.11	0.449	3.884	0.252
Ex025 I025	-0.428	0.12	1.096	3.902	0.250
Ex007 I007	-0.447	0.13	0.446	3.946	0.245
Ex075 I075	-1.314	0.16	-1.420	3.994	0.239
Ex010 I010	1.349	0.11	0.554	4.211	0.216
Ex022 I022	1.244	0.10	1.621	4.843	0.159
Ex012 I012	0.965	0.11	-1.105	5.255	0.128
Ex077 I077	-1.524	0.20	-1.525	5.629	0.104
Ex004 I004	-0.144	0.12	1.507	5.728	0.099
Ex080 I080	-0.310	0.12	-1.204	5.754	0.097

Ex050 I050	0.717	0.10	-1.629	5.810	0.094
Ex066 I066	1.488	0.10	1.467	5.826	0.093
Ex067 I067	0.298	0.10	0.704	6.081	0.080
Ex090 I090	-0.295	0.11	-1.158	6.091	0.080
Ex046 I046	0.651	0.10	-1.792	6.354	0.068
Ex078 I078	-0.192	0.11	-1.308	6.770	0.051
Ex034 I034	-0.238	0.12	-1.543	7.115	0.040
Ex058 I058	0.497	0.10	0.544	7.284	0.035
Ex083 I083	-2.023	0.29	0.751	7.628	0.025
Ex061 I061	-0.787	0.12	1.947	7.660	0.024
Ex088 I088	-1.171	0.15	-0.200	8.402	0.009
Ex026 I026	1.043	0.10	1.704	8.769	0.003
Ex048 I048	-0.271	0.11	-2.044	9.476	0.000
Ex065 I065	-0.796	0.12	1.057	11.162	0.000
Ex051 I051	-1.627	0.22	2.036	11.982	0.000
Ex052 I052	0.242	0.10	2.592	15.940	0.000

Notes

1. Location is the item difficulty in logits.
2. SE is the standard error
3. Residual is the difference between the expected score from the model and the actual score.
4. Probab is the probability of fit to the model based on the chi-square. These are not to be taken too literally, but to be used as a guide to fit.