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Self-regulation of assessment beliefs and attitudes: A review of the Students' Conceptions of
Assessment inventory
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Abstract

How students understand, feel about, and respond to assessment might contribute significantly to learning behaviour and academic achievement. This paper reviews studies that have used a relatively new self-reported survey questionnaire (*Students' Conceptions of Assessment—SCoA*) about student perceptions and understandings of assessment. Confirmatory factor analyses and structural equation modeling results have shown, consistent with self-regulation theory, that the SCoA inventory has meaningful relations with academic performance among New Zealand high school students. Further, German, Hong Kong, American, and New Zealand studies have shown that the SCoA has relations to motivational constructs (e.g., effort, learning strategies, interest, self-efficacy, and anxiety) that are also consistent with self-regulation. The SCoA inventory extends our understanding of how student conceptions of assessment are an integral part of self-regulation and provide a warrant for use in research studies investigating test-taker responses to assessment practices and innovations at both university and high school levels.

Theoretical framework

How students understand, feel about, and respond to assessment might contribute significantly to learning behaviour and academic achievement. Ajzen's (1991, 2005) model of planned or reasoned behavior suggests that personal intentions or goals, beliefs about what others think, and sense of power to fulfill one's intentions shape behaviour. Furthermore, self-regulation theory indicates that certain kinds of cognitions, feelings, and actions lead to increased learning outcomes (Boekaerts & Cascallar, 2006). For example, taking responsibility for one's actions (Zimmerman, 2008), having positive affect in learning (Pekrun, Goetz, Titz, & Perry, 2002), and making use of feedback (Hattie & Timperley, 2007) are adaptive self-regulating responses; whereas, blaming external, uncontrollable factors (Weiner, 1986; 2000), prioritising emotional well-being (Boekaerts & Corno, 2005), and ignoring learning-related evaluations are examples of maladaptive, non-regulating responses that lead to decreased academic achievement. Research has shown that assessment influences students' behaviors, learning, studying, and achievement (Entwistle, 1991; Peterson & Irving, 2008; Struyven, Dochy, & Janssens, 2005). Hence, it seems credible that, within schooling contexts, student opinions about the nature and purpose of assessment would influence student learning-related behaviours and educational achievement.

In terms of how students conceive of the nature and purpose of assessment, four major conceptions appear in the literature. First and foremost, students are aware that assessment exists in order to improve learning and teaching (Olsen & Moore, 1984; Peterson & Irving, 2008; Pajares & Graham, 1998; Stralberg, 2006) and that this may be achieved through evaluating their performance (Brookhart & Bronowicz, 2003; Harlen, 2007; Reay & Wiliam, 1999; Zeidner, 1992). Second, students are aware that assessment is used to evaluate external factors outside their own control such as the quality of their schools, their intelligence, and their future (Peterson & Irving, 2008). Thirdly, the literature clearly indicates that students are aware that assessment has an affective impact on their emotional well-being and the quality of relationships they have with other students (Cowie, 2009; Moni, van Kraayenoord, & Baker, 2002; Pekrun et al., 2002; Weeden, Winter, & Broadfoot, 2002). Finally, students are aware that assessment can be an unfair, negative, or irrelevant process in their lives (Moni, et al., 2002; Peterson & Irving, 2008; Walpole et al., 2005).

The purpose of this paper is to review a body of studies that have used a relatively new self-reported survey questionnaire (*Students' Conceptions of Assessment—SCoA*) about student perceptions and understandings of assessment and related those results to measures of academic achievement and to other self-reported psychological and motivational measures. The goal is to both introduce the reader to the instrument and provide evidence that student perceptions of assessment as elicited by the instrument have meaningful relations consistent with self-regulation theory. The paper first reviews studies that have link SCoA responses to measures of academic performance among New Zealand high school students and then studies that related the SCoA to motivational constructs are reviewed.

Background to the Students' Conceptions of Assessment Inventory

The Students' Conceptions of Assessment (SCoA) inventory is a self-rating instrument in which high school students indicated the extent to which they agree or disagree with statements about the purposes of assessment. Brown and Hirschfeld (2007) trialled the first version of the inventory in New Zealand (SCoA-I) in 2003 as four independent parts to mitigate potential participant fatigue. Four purposes of assessment were identified (i.e., "assessment makes schools and students accountable", "assessment improves teaching and learning", "assessment is negative or bad", and "assessment is useful").

With the second version of the inventory (SCoA-II), four conceptions (i.e., "assessment makes schools accountable", "assessment makes students accountable",

“assessment is fun”, and “assessment is ignored”) were estimated simultaneously in a survey conducted in 2004 with nearly 3500 New Zealand high school students (Brown & Hirschfeld, 2008). Three conceptions were strongly and positively correlated with each other, while the “assessment is ignored” conception was weakly and negatively correlated with the same three conceptions. In an invariance study of the SCoA-II inventory, Hirschfeld and Brown (2009) concluded that the instrument had invariant measurement properties across sex, year level, and ethnicity.

In further extending the meaning of students’ conceptions of assessment with two progressively more complete inventories (SCoA-III: Brown & Hirschfeld, 2005; SCoA-IV: Brown, 2006) New Zealand students were asked to also indicate what types of assessment practices they associated with the term ‘assessment’. Two major classes of assessment types were found (i.e., teacher-controlled test-like assessments and informal-interactive assessments). In the SCoA-IV, six inter-correlated conceptions of assessment were found (i.e., “assessment makes students accountable”, “I use assessment”, “teachers use assessment”, “the public uses assessment”, “assessment is fun”, and “assessment is irrelevant”). All conceptions, except “assessment is irrelevant”, had weak correlations with the interactive assessment type. Furthermore, five of the conceptions were positively inter-correlated, while the “assessment is irrelevant” conception was weakly and negatively correlated with all the other conceptions.

In a national survey of New Zealand high school students conducted in 2006, the fifth version of the inventory (SCoA-V) was used to establish the structure of student conceptions of assessment and their relations to assessment type (Brown, Irving, Peterson, & Hirschfeld, 2009). Four major second-order conceptions were found (i.e., “assessment improves learning”, “assessment makes students and schools accountable”, “assessment is beneficial”, and “assessment is irrelevant”). Three of the four major conceptions were strongly and positively inter-correlated. As before, “assessment is irrelevant” was negatively and weakly related to those three conceptions; indeed, the path to “assessment is beneficial” was not statistically significant. The conception “accountability/external factors” measures lack of personal autonomy or control, divided into the degree to which assessment measures a fixed personal future or it measures school quality. The conception “affect/benefit” measures the affective or emotional impact of assessment and consists of assessment as a personally enjoyable experience and assessment as a benefit to the class environment. The conception “improvement” indicates that the goal of assessment is to improve students’ own use of assessment to improve learning and teachers’ use to improve teaching. The conception “irrelevance” measures a negative evaluation of assessment because it is seen as bad, subjective, or unfair and whether it is tolerated but ignored. Each conception was divided into two first-order sub-conceptions which were used in a structural model to establish relations to assessment types. There was one additional pathway from “assessment is irrelevant” to the second-order conception “personal enjoyment”.

Most recently, the SCoA-V inventory was used in 2007 to investigate the beliefs of three cohorts of New Zealand high school students in relation to their definitions of assessment and their performance in mathematics (Brown, Irving, & Peterson, 2008). This study developed a sixth version of the inventory (SCoA-VI) by revising the measurement model only. In the SCoA-VI the items are identical to SCoA-V but all four second-order conceptions were inter-correlated and the pathways from the second-order conceptions to the first-order conceptions were simplified. The pathway from “assessment is ignored” to “personal enjoyment” was removed to attain structural simplicity and, as a consequence, the first-order sub-conception “assessment is ignored” generated negative error variance. Hence, all the items were given paths directly to the second-order conception “assessment is irrelevant”. This revised solution was configurally invariant for both SCoA-V and SCoA-VI

samples. Again the inter-correlations were strongly positive for three of the second-order conceptions, while the arcs from “assessment is irrelevant” were negative and weak to moderate.

Student Conceptions of Assessment Version 6 (SCoA-VI) Inventory

The Students’ Conceptions of Assessment version 6 (SCoA-VI) uses 33 self-report items in which participants rate their level of agreement using a six-point, positively-packed rating scale (Brown, 2004; Lam & Klockars, 1982). Thus, there were two negative response and four positive response points labelled ‘strongly disagree’, ‘disagree’, ‘slightly agree’, ‘moderately agree’, ‘mostly agree’, and ‘strongly agree’; each point was scored 1 to 6 respectively. The SCoA-VI summarises student conceptions of assessment as four inter-correlated constructs (i.e., “Assessment Improves Learning and Teaching [Improvement]”, “Assessment Relates to External Factors [External]”, “Assessment has Affective Benefit [Affect]”, and “Assessment is Irrelevant [Irrelevance]”). Figure 1 illustrates the measurement model structure of the SCoA-VI and Appendix A provides the items and their factors.

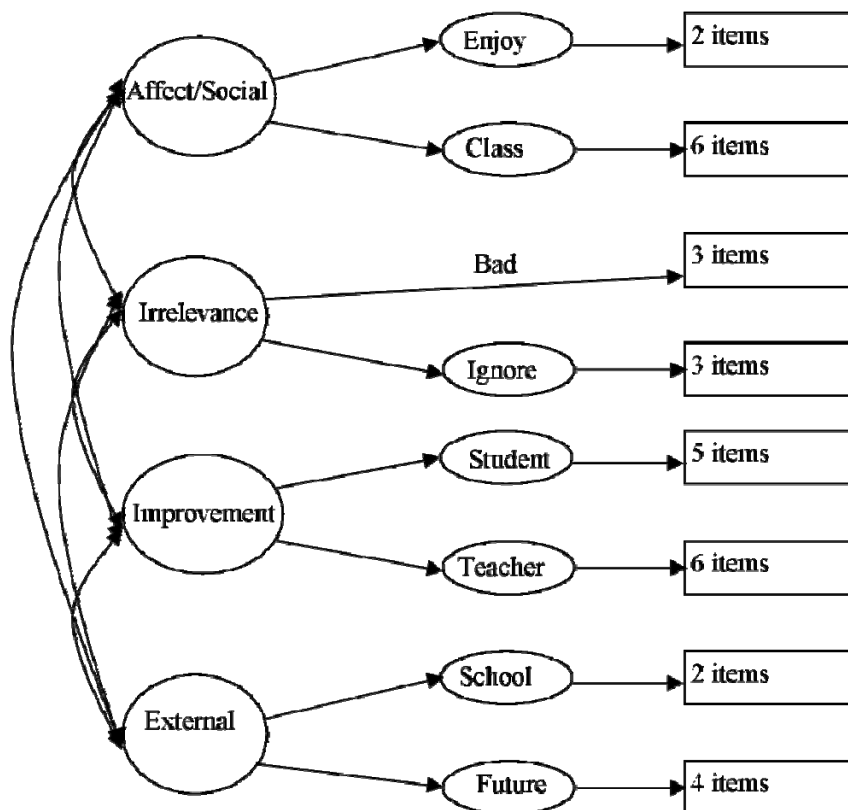


Figure 1. Measurement Model Schematic Structure of the SCoA-VI inventory

The Improvement conception captures the notion that the purpose of assessment is to improve student learning and teachers’ instruction. Improvement occurs as students use assessments to evaluate, plan, and improve their learning activities and as teachers interpret student performance as a means of improving instructional activities. This factor reflects an adaptive, self-regulating response on a growth pathway. In contrast, the External conception captures student perception that assessments measure their future and intelligence or the quality of schooling. These perceptions relate to a lack of personal autonomy or control or external locus of control attributions (i.e., it is about the school and my future) which are clearly maladaptive non-regulating beliefs. The Affect conception captures the degree to which students consider assessment to be a personally enjoyable experience and the degree to which they consider assessment benefits the class environment. This factor relates to the

well-being pathway in that it focuses on the enjoyment emotion and the quality of peer relations in response to assessment. The Irrelevance conception captures students' tendency to ignore or negatively evaluate assessment. This factor is maladaptive to the growth pathway since it rejects the validity of assessment to provide learning-related feedback.

SCoA Studies

A total of six versions of the SCoA have been tried and reported, culminating in the current version. While the SCoA was developed in New Zealand with high school students, the inventory has been used elsewhere (i.e., Brazil, Germany, Hong Kong, Netherlands, USA), with university students (i.e., New Zealand, USA, and Germany), and has been translated into other languages (i.e., Chinese, Dutch, German, Portuguese). The SCoA inventory responses have been mapped to measures of academic performance (i.e., reading comprehension, mathematics, and the New Zealand National Certificate of Educational Achievement), definitions of assessment, and a variety of motivation constructs (i.e., attendance and effort on a low-stakes test, conceptions of feedback, definitions of assessment, interest in reading, learning strategies, self-efficacy in reading, and self-reported test anxiety). The stability of responses to the inventory has been tested according to participant demographic (i.e., sex, age, and ethnicity) and motivational (i.e., high and low interest in reading and self-efficacy in reading) sub-groupings. The focus of this paper is on studies which have related SCoA responses to academic achievement and motivational constructs as a way of demonstrating that student conceptions of assessment appear to be an important facet of self-regulation in academic environments.

Adaptive and Maladaptive Consequences of SCoA

Table 1 summarises eight studies which have tested in structural equation models simultaneous multiple regressions from SCoA factors to measures of academic performance. Seven of the studies have used the New Zealand Assessment Tools for Teaching and Learning (asTTle) tests which are standardised, calibrated measures of the New Zealand curriculum in reading comprehension, mathematics, and writing for voluntarily use by schools with students in Years 4 to 12 (ages 9 to 17) (Hattie et al., 2006). Through item response theory based scoring, regardless of test content and difficulty, all total scores within a subject are comparable. The eighth study used data from the New Zealand National Certificate of Educational Achievement (NCEA) Level 1 assessments of performance in English. NCEA Level 1 is administered in the third year of secondary schooling and is conceptually equivalent to the UK GCSE. Students' total score is a combination of school-based internal assessments and end-of-year externally-administered examinations. Scores were standardised by creating a grade-point-average score (Shulruf, Hattie, & Tumen, 2008). It is worth noting that except for the NCEA internal assessment, all measures of academic performance are one-off, on-demand tests or examinations.

Table 1. New Zealand SCoA-Academic Performance Studies

Yr collected	Sample		Instrument			Academic Performance				
	Characteristics	<i>N</i>	version	Factors	# items	Fit Statistics	Measure	Relationships	Variance Explained	Invariance Results
<i>Brown & Hirschfeld, 2007</i>										
2003	NZ secondary students; 61% female; 68% European;	162	Ia	students accountable; schools accountable	3; 3=6	$\chi^2/df=1.86$; RMSEA=.073; CFI=.97; gamma hat=.97	asTTle mathematics score	B=.14; -.01 respectively	$R^2=.039$	na
		219	Ib	improves teaching; good for me; fun	2; 5; 2=9	$\chi^2/df=1.80$; RMSEA=.061; CFI=.94; gamma hat=.97		$\beta =-.12; .55; .40$ respectively	$R^2=.066$	na
		502	Ic	interferes; ignore; error	6; 3; 2=11	$\chi^2/df=2.92$; RMSEA=.062; CFI=.92; gamma hat=.96		$\beta =-.21; -.06; -.04$ respectively	$R^2=.055$	na
		308	Id	valid; captures thinking; reliable	4; 2; 3=9	$\chi^2/df=1.97$; RMSEA=.056; CFI=.94; gamma hat=.98		B=.44; -.19; -.31 respectively	$R^2=.053$	na
<i>Brown & Hirschfeld, 2008</i>										
2004	NZ secondary students; 54% female; 55% European; 1462 Y9, 967 Y10, 449 Y11, 591 Y12	3469	II	student accountability; school accountability; fun; ignored	3; 3; 2; 3=11	$\chi^2/df=5.56$; RMSEA=.051; TLI=.91; CFI=.93; gamma hat=.97	asTTle reading score	B=.42; -.27; -.24; -.14 respectively	$R^2=.083$	na
<i>Walton, 2009</i>										

Yr collected	Sample		Instrument			Academic Performance			Variance Explained	Invariance Results
	Characteristics	N	version	Factors	# items	Fit Statistics	Measure	Relationships		
2004	NZ secondary students; 54% female; 55% European; Y9-Y12	1774	IIA1	2 hierarchical: Benefits (me accountable; help & enjoy; inform); schools acc; Bad (unfair; useless)	3;2;2;3;3;4=17	$\chi^2/df=4.27$; RMSEA=.043; TLI=.94; CFI=.95; SRMR=0.038; gamma hat=.97	asTTle reading score	$\beta=.63$; -.17; -.39; -.27; -.02; -.26 respectively	SMC=.25	strong invariance sex; weak invariance ethnicity; weak invariance year
		1623	IIA2		3; 3; 4; 3; 3; 4=20	$\chi^2/df=6.56$; RMSEA=.059; TLI=.85; CFI=.87; SRMR=.059; gamma hat=.94		$\beta=.79$; -.27; -.22; -.32; -.18; -.05 respectively	SMC=.28	strong invariance sex; weak invariance ethnicity; weak invariance year
<i>Hirschfeld & Brown, 2009</i>										
2004	NZ secondary students; Ethnicity	1908 F; 1561M	II	student accountability; school accountability; fun; ignored	3; 3; 2; 3=11	$\chi^2/df=4.20$; RMSEA=.030; TLI=.95; CFI=.96; gamma hat=.99	asTTle reading score	Female, Male; $\beta=.42$, .61; -.11, -.48; -.51, -.20; -.19, -.07 respectively	na	full invariance MM; configural invariance SEM
		1969 European; 474 Maori; 290 Pasifika; 736 Asian-Others						$\chi^2/df=2.79$; RMSEA=.024; TLI=.95; CFI=.96; gamma hat=1.00	European, Pasifika, Asian-Others; $\beta=.46$, .72, .49; -.30, -.33, -.12; -.24, -.40, -.61; -.12, -.30, -.13 respectively	na

Yr collected	Sample		Instrument			Academic Performance			Variance Explained	Invariance Results
	Characteristics	N	version	Factors	# items	Fit Statistics	Measure	Relationships		
	NZ secondary students; YEAR	1462 Y9, 967 Y10, 449 Y11, 591 Y12				$\chi^2/df=2.70$; RMSEA=.022; TLI=.95; CFI=.96; gamma hat=1.00		Y9, 10, 11, 12; $\beta=.60$, .46, .38, .70; -.30, -.34, -.09, -.56; -.40, -.24, -.67, -.18; -.23, -.16, -.10, -.12 respectively	na	full invariance MM; configural invariance SEM
<i>Brown & Hirschfeld, 2005</i>										
2005	NZ Secondary students, 4 schools in Auckland; ages 12-16	85	III	schools; enjoy; valid; helps me; ignore; hate; interferes; evaluates	3, 2; 3; 3; 2; 3; 2; 5=25	$\chi^2/df=1.67$; RMSEA=.078; TLI=.80; gamma hat=.90	asTTle mathematics score	$\beta=-.29$; -.23; .05; .07; -.15; -.05; -.17; .24 respectively	SMC=.20	na
<i>Brown, Peterson, & Irving, 2009</i>										
2006; 2007	NZ Secondary students, national survey; 31 schools; all Y9 & 10 + 3 Auckland Secondary schools	520	VI	Hierarchical: External (School, Future); Affect/Benefit (Class, Personal); Improvement (Student, Teacher); Irrelevance (Bad, Ignore)	2, 4; 2, 6; 5; 6; 3, 3 =33	$\chi^2/df=2.21$; RMSEA=.048; SRMR=.064; gamma hat=.91	asTTle Mathematics + assessment definitions	external factors (student future/school acc)=-.82; improvement (student/teacher)=.65; test-like=.26	SMC=.20	na
<i>Brown, Irving, & Peterson, 2009</i>										
2007	NZ Secondary Students, 3 Auckland schools; age M=13.6, Y9 88%, Y10 12%	499	VI	Hierarchical: External (School, Future); Affect/Benefit (Class, Personal); Improvement	2, 4; 2, 6; 5; 6; 3, 3 =33	$\chi^2/df=2.83$; RMSEA=.061; SRMR=.079; gamma hat=.81; Cronbach's alpha= .94; .88; .90; .82	Conceptions of Feedback; asTTle maths	CoFB-III: Extrinsic Attributions-Meets Standards; Improvement-Parent, Motivates, Trust Teacher FB; Irrelevant-irrelevant; Personal-Personal;	SMC=.13	na

Yr collected	Sample		Instrument			Academic Performance			Variance Explained	Invariance Results
	Characteristics	<i>N</i>	version	Factors	# items	Fit Statistics	Measure	Relationships		
				(Student, Teacher); Irrelevance (Bad, Ignore)				Class-Class. asTTle maths: .30; - .26; -.32; -.17		
	<i>'Otunuku, 2010</i>									
		108				Total: $\chi^2/df=5.78$; RMSEA=.21; TLI=.73; CFI=.87; SRMR=.073; gamma hat=.92	NCEA L1 English total	Improvement=.23	SMC=.05	
2008	Tongan students in NZ secondary schools	97	VI	parcelled as 4 variables (Improvement; Irrelevant; Affect/Social; Extrinsic Attributions)	4	Internal: $\chi^2/df=5.31$; RMSEA=.21; TLI=.74; CFI=.85; SRMR=.088; gamma hat=.90	NCEA L1 English internal;	NIL	SMC=.00	Na
		50				External: $\chi^2/df=2.65$; RMSEA=.18; TLI=.86; CFI=.93; SRMR=.059; gamma hat=.94	NCEA L1 English external	Improvement=.30	SMC=.09	

Notes. RMSEA=root mean square error of approximation; TLI=Tucker-Lewis index; CFI=comparative fit index; SRMR=standardized root mean residual; SMC=squared multiple correlate.

In accordance with self-regulation frameworks, statistically significant increased academic performance was noted for the adaptive factors: assessment makes students accountable, assessment is good for me, assessment is valid (Brown & Hirschfeld, 2007); assessment makes students accountable (Brown & Hirschfeld, 2008); assessment makes me accountable (Walton, 2009); assessment evaluates me (Brown & Hirschfeld, 2005); assessment improves student learning and teacher instruction (Brown, Peterson, & Irving, 2009); assessment and feedback are for improvement (Brown, Irving, & Peterson, 2009); and assessment is for improvement ('Otunuku, 2010). In contrast, negative relations were found in the studies using the asTTle test system for the factors of considering assessment to be bad, unfair, interfering, useless, hated, or irrelevant. Similarly, all factors identifying external attributions (e.g., school quality or student future) had negative relations to academic performance. Furthermore, factors focused on well-being (e.g., fun, enjoyable, class environment) had negative regressions towards achievement.

In order to cope with the small sample size in 'Otunuku's (2010) study with students of Tongan ethnicity, the complex factor structure of the SCoA was reduced by parcelling the four meta-factors into single manifest variables (Little, Cunningham, Shahar, & Widaman, 2002). In that study, only the one-off, external examination grade was predicted by the SCoA. This suggests that the more diffuse, continuous assessment experienced in the NCEA internal assessment requires a different way of conceiving assessment.

Hirschfeld and Brown (2009) examined the stability of the structural paths from the SCoA-II abridged to academic performance in reading for three demographic variables. They found only configural invariance for the structural models and gave reasons as to why the regression weights might differ according to various attributes associated with student sex, ethnicity, and age (e.g., older students had experience of the qualification system). Thus, the SCoA appears to elicit responses that are consistent with real-world differences in how various sub-populations experience assessment.

It should also be noted that the proportion of variance in academic performance explained by the SCoA factors is not trivial. When treated as univariate regressions, the R^2 values range between .04 and .08; however, the squared multiple correlations show considerably larger variance explained (range .05 to .28; $M=.17$, $SD=.08$). Given that the SMC is a better estimate of all the variance in a model, it seems plausible to assume that a moderate effect (mean effect $f^2=.20$ [Cohen, 1992]) in academic performance is attributable to the beliefs students have about the nature and purpose of assessment.

Motivational Constructs and SCoA

Four studies have examined the relationship of the SCoA to motivational constructs (Table 2). Hirschfeld and von Brachel (2008) used a German translation of the SCoA-II with an additional item as part of a study with undergraduate psychology students into their learning behaviours for assessment. In a good fitting model, they found that three of the SCoA factors predicted individualised learning strategies (e.g., mind mapping or summary writing). The paths from student and university accountability predicted increased self-reported usage of these strategies, while the enjoyment affective response acted as a negative predictor of individualised learning strategies. This appears to suggest that agreement with the evaluative purpose of assessment acts adaptively to increase personal responsibility in learning behaviour, while emphasis on the affective domain appears inimical to the growth-related pathway.

Table 2. The Relationship of SCoA to Motivational Constructs

Sample		Instrument				External Construct				Varianc	Invarianc	
Yr	Characteristi	N	version	Languag	Factors	# items	Analysis	Fit	Measure	Relationships	Explaine	Results
collecte				e				Statistics			d	e
<i>Hirschfeld & von Brachel, 2008</i>												
2007	German Psychology University Students; 275 Fem; M age=24.28	356	II plus (additional item)	German	student accountability; university accountability; fun; ignored	3; 3; 3; 3=12	CFA/SEM	$\chi^2/df=2.83$; RMSEA=.0 76; TLI=.90; gamma hat=.99	German Student Evaluation of Assessment Tasks	Individual Learning Strategies: $\beta=.19, .12, -.23$, ns; respectively	na	na
<i>Walton, 2009</i>												
2004	NZ secondary students; 54% female; 55% European; Y9-Y12	1150 Hi+1150 Lo=2300	IIA1	English	3 inter- correlated, hierarchical factors: Benefits (me accountable; helpful & enjoyable; informs me); Schools Accountable; Bad (unfair; useless)	3;2;2;3;3; 4 =17	MGCFA (Hi-Lo Like; Hi- Lo Self- Efficacy) SEM	RMSEA=.0 34 SE; .037 Like; gamma hat=.94 SE; .93 Like RMSEA=.0 41 SE; .041 Like; gamma hat=.95 SE; .87 Like	asTTle reading score conditioned upon High or Low Like/SE	HI SE: $\beta=.63; -.40; -.44; .02$; -.13; -.26 respectively. LO SE: $\beta=.91; -.18; -.46; -.37$; -.08; -.11 respectively. HI LIKE: $\beta=.59; -.21; -.57$; -.08; -.20; -.19 respectively. LO LIKE: $\beta=.79; -.12; -.22$; -.50; .00; -.08 respectively	na	SE & Like: config- ural invari- ance only

Yr collected	Sample		Instrument					External Construct			Variance Explained	Invariance Results
	Characteristics	N	Version	Language	Factors	# items	Analysis	Fit Statistics	Measure	Relationships		
<i>Gao, 2010</i>												
2009	HK High school students, English medium instruction	527	V (modified for SBA-abbreviated to 24 items)	Chinese	Improvement; Accountability; Irrelevance; Enjoyment	7; 5; 2; 5=19	EFA /ANOVA /multiple regression	na	Self-reported anxiety in SBA	Anxiety: Accountability $\beta=.31$; Irrelevance $\beta=-.11$; Enjoyment $\beta=-.15$	additional $R^2=0.02$	na
<i>Wise & Cotten, 2009</i>												
2008	US University students, 1 university, multiple degrees	802	VI (modified for spelling)	English	Hierarchical: External (School, Future); Affect/Benefit (Class, Personal); Improvement (Student, Teacher); Irrelevance (Bad, Ignore)	2, 4; 2, 6; 5; 6; 3, 3 =33	hierarchical multiple regression; independent t-tests	na	Test taking effort (response time effort-RTE); SAT verbal & math; oral communication test; attendance at a low-stakes test	External: $d=.33$ attendance; Affect: $\beta=-.22$ RTE, $d=.23$ attendance; Improvement: $\beta=.28$ RTE, $d=.46$ attendance; Irrelevance: $\beta=-.11$ RTE, $\beta=-.46$ attendance;	na	na

Notes. SE=self-efficacy; EFA=exploratory factor analysis; CFA=confirmatory factor analysis; SEM=structural equation model; MGCFA=multi-group confirmatory factor analysis; RMSEA=root mean square error of approximation; TLI=Tucker-Lewis index; CFI=comparative fit index; SRMR=standardized root mean residual; SMC=squared multiple correlate.

Walton (2009) used the full SCoA-II to predict reading performance and conducted multi-group confirmatory factor analysis invariance testing by the how interested students were in reading (Like) and how confident they were good at reading (i.e., self-efficacy). He found well-fitting models for the two versions of the SCoA-II with configural invariance for the four different models (i.e., SCoA-IIA/B * Hi-Lo SE; * Hi-Lo Like). The differences in structural paths to reading performance indicated that students with high levels of interest and self-efficacy in reading were more negatively impacted if they emphasised maladaptive beliefs that assessment was bad or could be ignored, while students with low levels of interest and self-efficacy were positively assisted when they emphasised the self-regulating belief that assessment grades and makes them accountable. While the SCoA conception External includes a statement about intelligence, this factor was not one in which there were statistically significant differences between high and low motivation students. Hence, the emphasis here is on beliefs about the purpose of assessment, rather than student beliefs about their intelligence or ability. Clearly, endorsement of the External (including intelligence) conception of assessment is relatively consistent across levels of motivation and thus does not play a meaningful role in discriminating between high and low motivation students insofar as their beliefs about the purpose of assessment.

Gao (2009), using an abbreviated version of SCoA-V translated into Chinese, found that the SCoA factors had convergent relations to a self-reported measure of anxiety relative to the high-stakes school-based assessment (SBA) system used in Hong Kong. Increased awareness of the unfair, inaccurate, accountability grading of SBA led to greater anxiety; whereas increased endorsement of the irrelevance of SBA and enjoyment in doing SBA resulted in decreased levels of anxiety.

The full SCoA-V, with minor changes to Americanise the spelling, was used in a study with students at one US university which annually administers a low-stakes system evaluation test (Wise & Cotten, 2009). This study obtained SCoA data and found meaningful relations between it and two measures of motivation (i.e., time taken to respond to a computer administered test—response time effort (RTE) and attendance at the low-stakes testing day). Less guessing (i.e., longer response times) was associated with greater belief that assessment leads to improvement, while more guessing was predicted by lower Affective benefit and greater Irrelevance of assessment. Attendance on the day of the low-stakes test was considerably higher for those who endorsed improvement and affect and rejected irrelevance.

Discussion

The psychometric properties of the Student Conceptions of Assessment inventory have been evaluated in a series of studies with New Zealand high school students and with student populations in other countries. The SCoA-VI has four major inter-correlated factors (i.e., Improvement, External Attributions, Affective Benefit, and Irrelevance) consistent with self-regulation theories of adaptive and maladaptive responses and the tension between growth and well-being. The studies which have linked the SCoA to academic performance produce replicated patterns of adaptive consequences for the Improvement conception, maladaptive consequences for the Irrelevance, External Attributions and Affective Benefit conceptions. These self-reported beliefs have considerable explanatory power for academic performance, suggesting that if student beliefs about the nature and purpose of assessment could be modified from maladaptive or well-being pathways to adaptive beliefs on a growth pathway, considerable gains in performance should be found.

The relationship of the adaptive SCoA factors to greater effort and more individualised learning strategies, combined with an association between the maladaptive or well-being conceptions of assessment and greater anxiety suggests that the SCoA taps into meaningful achievement related emotions and behaviours. Differing levels of interest and

self-efficacy in subjects appear to change or mediate the effect of the adaptive, maladaptive, and well-being conceptions of assessment, suggesting that different messages and responses about assessment are needed depending on student psychological profile. It is worth repeating here that the SCoA focuses on students' conceptions of how assessment functions and what it is rather than on students' understandings of intellectual ability, which did not play a statistically significant role in discriminating between high and low motivation students. These studies point to the importance of understanding how students conceive of assessment as an influential aspect of their motivation.

Together, these studies suggest that the SCoA-VI not only has a meaningful relationship to self-regulation, but extends our understanding of how student conceptions of assessment are an integral part of self-regulation. The studies provide a warrant for use in research studies investigating test-taker responses to assessment practices and innovations at both university and high school levels and there are suggestions that the instrument appears to elicit consistent responses across multiple locations, levels of learning, and language.

Nonetheless, further experimental research is needed to extend the promising leads that this program of survey research has identified. Specifically, it needs to be established whether student conceptions of assessment can be modified towards greater adaptivity and growth-orientation. If this can be achieved, it needs to be determined whether such changes lead to the academic performance gains expected by the models reported here. Subsequently, it seems important to establish whether teachers can identify students with maladaptive or well-being orientations and bring about increased growth-orientation in their students. It may also be that teachers themselves need to adopt new orientations which emphasise growth over well-being. The SCoA-VI instrument can play an important role in carrying out this research.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (2005). *Attitudes, personality and behavior* (2nd ed.). New York: Open University Press.
- Brown, G. T. L. (2004). Measuring attitude with positively packed self-report ratings: Comparison of agreement and frequency scales. *Psychological Reports*, 94, 1015-1024.
- Brown, G. T. L. (2006, September). *Secondary school students' conceptions of assessment: A Survey of Four Schools*. Conceptions of Assessment and Feedback Project Report #5. Auckland, NZ: University of Auckland.
- Brown, G. T. L. & Hirschfeld, G. H. F. (2005, December). *Secondary school students' conceptions of assessment*. Conceptions of Assessment and Feedback Project Report #4. Auckland: University of Auckland.
- Brown, G. T. L. & Hirschfeld, G. H. F. (2007). Students' conceptions of assessment and mathematics achievement: Evidence for the power of self-regulation. *Australian Journal of Educational and Developmental Psychology*, 7, 63-74.
- Brown, G. T. L., & Hirschfeld, G. H. F. (2008). Students' conceptions of assessment: Links to outcomes. *Assessment in Education: Principles, Policy and Practice*, 15(1), 3-17.
- Brown, G. T. L., Irving, S. E., & Peterson, E. R. (2009, August). *The more I enjoy it the less I achieve: The negative impact of socio-emotional purposes of assessment and feedback on academic performance*. Paper presented at EARLI 2009 biennial conference, Amsterdam, NL.
- Brown, G. T. L., Irving, S. E., Peterson, E. R., & Hirschfeld, G. H. F. (2009). Use of interactive-informal assessment practices: New Zealand secondary students' conceptions of assessment. *Learning & Instruction*, 19(2), 97-111.
- Brown, G. T. L., Peterson, E. R., & Irving, S. E. (2009). Self-regulatory beliefs about assessment predict mathematics achievement. In D. M. McInerney, G. T. L. Brown, & G. A. D. Liem (Eds.) *Student perspectives on assessment: What students can tell us about assessment for learning* (pp. 159-186). Charlotte, NC: Information Age Publishing.
- Boekaerts, M., & Cascallar, E. (2006). How far have we moved towards the integration of theory and practice in self regulation? *Educational Psychology Review*, 18(3), 199-210.
- Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology: An international review*, 54(2), 199-231.
- Brookhart, S. M., & Bronowicz, D. L. (2003). 'I don't like writing. It makes my fingers hurt': Students talk about their classroom assessments. *Assessment in Education*, 10(2), 221-242.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155-159.
- Cowie, B. (2009). My teacher and my friends helped me learn: Student perceptions and experiences of classroom assessment. In D. M. McInerney, G. T. L. Brown, & G. A. D. Liem (Eds.), *Student perspectives on assessment: What students can tell us about assessment for learning* (pp. 85-105). Charlotte, NC: Information Age Publishing.
- Gao, M. (2010). *Student perspectives of school-based assessment*. Unpublished doctoral dissertation, University of Hong Kong, Hong Kong.
- Harlen, W. (2007). *Assessment of learning*. Los Angeles: Sage.
- Hattie, J. A., Brown, G. T. L., Ward, L., Irving, S. E., & Keegan, P. J. (2006). Formative evaluation of an educational assessment technology innovation: Developers' insights

- into Assessment Tools for Teaching and Learning (asTTle). *Journal of Multi-Disciplinary Evaluation*, 3(5), 1-54.
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1), 81-112.
- Hirschfeld, G. H. F., & Brown, G. T. L. (2009). Students' conceptions of assessment: Factorial and structural invariance of the SCoA across sex, age, and ethnicity. *European Journal of Psychological Assessment*, 25(1), 30-38.
- Hirschfeld, G. H. F., & von Brachel, R. (2008). *Students' conceptions of assessment predict learning strategy-use in higher education*. Paper presented at the Biannual Conference of the International Test Commission (ITC).
- Lam, T. C. M., & Klockars, A. J. (1982). Anchor point effects on the equivalence of questionnaire items. *Journal of Educational Measurement*, 19(4), 317-322.
- Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, 9(2), 151-173.
- Moni, K. B., van Kraayenoord, C. E., & Baker, C. D. (2002). Students' perceptions of literacy assessment. *Assessment in Education*, 9(3), 319-342.
- Olsen, L., & Moore, M. (1984). *Voices from the classroom: Students and teachers speak out on the quality of teaching in our schools*. Oakland, CA: Students for Quality Teaching Project / Citizens Policy Center.
- 'Otunuku, M. (2010). *Tongan conceptions of schooling in New Zealand: Insights and possible solutions to underachievement*. Unpublished doctoral dissertation, The University of Auckland, Auckland, NZ.
- Pajares, M. F., & Graham, L. (1998). Formalist thinking and language arts instruction: Teachers' and students' beliefs about truth and caring in the teaching conversation. *Teaching & Teacher Education*, 14(8), 855-870.
- Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: A program of qualitative and quantitative research. *Educational Psychologist*, 37(2), 91-105.
- Peterson, E. R., & Irving, S. E. (2008). Secondary school students' conceptions of assessment and feedback. *Learning and Instruction*, 18(3), 238-250.
- Reay, D., & Wiliam, D. (1999). 'I'll be a nothing': Structure, agency and the construction of identity through assessment. *British Educational Research Journal*, 25(3), 343-354.
- Shulruf, B., Hattie, J., & Tumen, S. (2008). The predictability of enrolment and first-year university results from secondary school performance: The New Zealand National Certificate of Educational Achievement. *Studies in Higher Education*, 33(6), 685-698.
- Stralberg, S. (2006). Reflections, journey, and possessions: Metaphors of assessment used by high school students. *Teachers College Record*. Retrieved 28 February 2007 from <http://www.tcrecord.org>. doi:12570
- Walpole, M., McDonough, P. M., Bauer, C. J., Gibson, C., Kanyi, K., & Toliver, R. (2005). This test is unfair: Urban African American and Latino high school students' perceptions of standardized college admission tests. *Urban Education*, 40(3), 321-349.
- Walton, K. F. (2009). *Secondary students' conceptions of assessment mediated by self-motivational attitudes: Effects on academic performance*. Unpublished masters thesis, University of Auckland, Auckland, NZ.
- Weeden, P., Winter, J., & Broadfoot, P. (2002). *Assessment: What's in it for schools?* London: RoutledgeFalmer.
- Weiner, B. (1986). *An attribution theory of motivation and emotion*. New York: Springer-Verlag.

- Weiner, B. (2000). Intrapersonal and interpersonal theories of motivation from an attributional perspective. *Educational Psychology Review*, *12*, 1-14.
- Wise, S. L., & Cotten, M. R. (2009). Test-taking effort and score validity: The influence of student conceptions of assessment. In D. M. McInerney, G. T. L. Brown, & G. A. D. Liem (Eds.), *Student perspectives on assessment: What students can tell us about assessment for learning* (pp. 187-205). Charlotte, NC: Information Age Publishing.
- Zeidner, M. (1992). Key facets of classroom grading: A comparison of teacher and student perspectives. *Contemporary Educational Psychology*, *17*, 224-243.
- Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, *45*(1), 166-183.

Appendix A. SCoA Version VI items and Factors History

code	item	SCoA versions					
		I	II abridged	II full	III	IV	V/VI*
<i>Affect/Social Benefit</i>							
COAimp9	Assessment is an engaging and enjoyable experience for me	Fun	Fun	Enjoy	Fun	Fun	Enjoy
COAimp10	Assessment is appropriate and beneficial for me	GoodMe	--		StudAcc	Fun	Enjoy
COAimp29	Assessment encourages my class to work together and help each other	--	--	--	--	--	ClassGood
COAimp30	Assessment motivates me and my classmates to help each other	--	--	--	--	--	ClassGood
COAimp31	Our class becomes more supportive when we are assessed	--	--	--	--	--	ClassGood
COAimp32	When we do assessments, there is a good atmosphere in our class	--	--	--	--	--	ClassGood
COAimp33	Assessment makes our class cooperate more with each other	--	--	--	--	--	ClassGood
COAimp34	When we are assessed, our class becomes more motivated to learn	--	--	--	--	--	ClassGood
<i>Irrelevance</i>							
COAir5	Assessment is unfair to students	Interferes	--	Unfair	Dislike	Irrelevant	Bad
COAir6	Assessment is value-less	Interferes	--	Useless	Dislike	Irrelevant	Bad
COAir13	Teachers are over-assessing	--	--	Unfair	Dislike	Irrelevant	Bad
COAir14	Assessment results are not very accurate	--	--	--	--	Irrelevant	Bad
COAir2	Assessment has little impact on my learning	Interferes	--	Useless	Interferes	Irrelevant	Ignore
COAir8	I ignore or throw away my assessment results	Ignore	Ignore	Useless	Ignore	Irrelevant	Ignore
COAir10	I ignore assessment information	Ignore	Ignore	Useless	Ignore	Irrelevant	Ignore
<i>Improvement</i>							
COAimp14	I look at what I got wrong or did poorly on to guide what I should learn next	--	--	--	--	I_Use	ImpStud
COAimp15	I make use of the feedback I get to improve my learning	--	--	--	--	I_Use	ImpStud
COAimp16	I pay attention to my assessment results in order to focus on what I could do better next time	--	--	--	--	I_Use	ImpStud
COAimp17	I use assessments to identify what I need to study next	--	--	--	--	I_Use	ImpStud
COAimp18	I use assessments to take responsibility for my next learning steps	--	--	--	--	I_Use	ImpStud
COAac5	Assessment is checking off my progress against achievement objectives (or standards)	StudAcc	StudAcc	StudAcc	StudAcc	StudAcc	ImpTchg
COAac14	Assessment measures show whether I can analyse and think critically about a topic	--	--	--	--	StudAcc	ImpTchg
COAimp21	My teachers use assessment to help me improve	--	--	--	--	TchrUse	ImpTchg
COAimp25	Assessment helps teachers track my progress	--	--	--	--	TchrUse	ImpTchg
COAimp26	Teachers use my assessment results to see what they need to teach me next	--	--	--	--	TchrUse	ImpTchg

code	item	SCoA versions					
		I	II abridged	II full	III	IV	V/VI*
<i>External Attributions</i>							
COAval5	Assessment is a way to determine how much I have learned from teaching	Valid	--	--	StudAcc	StudAcc	ImpTchg
COAac9	Assessment measures the worth or quality of schools	SchlAcc	SchlAcc	SchlAcc	SchlAcc	PublicUse	SchlAcc
COAac11	Assessment provides information on how well schools are doing	SchlAcc	SchlAcc	SchlAcc	SchlAcc	PublicUse	SchlAcc
COAac12	Assessment is important for my future career or job	--	--	--	--	PublicUse	StudFut
COAac16	Assessment results show how intelligent I am	--	--	--	--	StudAcc	StudFut
COAimp23	Assessment tells my parents how much I've learnt	--	--	--	--	TchrUse	StudFut
COAval11	Assessment results predict my future performance	Reliable		Enjoy	Valid	PublicUse	StudFut

Notes. *Version VI has identical items to SCoA-V; '--'=item did not fit any factor or was not presented; Bad=Assessment is bad for students; ClassGood=Assessment has social benefits; Dislike=I dislike assessment; Enjoy=Assessment is enjoyable; Error=Assessment has error; GoodMe=Assessment is good for me; I_Use=I use assessment to improve my learning; Ignore=I ignore assessment; ImpLrng=Assessment improves my learning; ImpStud=Assessment improves student learning; ImpTchg=Assessment improves teaching; Interferes=Assessment interferes; Irrelevant=Assessment is irrelevant; MyThink=Assessment captures my thinking; PublicUse=Assessment is used to inform the public; Reliable=Assessment is reliable; SchlAcc=Assessment makes schools and teachers accountable; StudAcc=Assessment makes students accountable; StudFut=Assessment predicts student future; TchrUse=Assessment is used by teachers; Unfair=Assessment is unfair; Valid=Assessment is valid.