Juxtaposition of Multi-dimensional Self-concept and Personality Constructs in Educational Settings: Construct Validity in Relation to Academic Outcomes

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How well can diverse academic outcomes (school grades, test scores, coursework selection in different school subjects) be predicted by big-five and well-being personality factors and multiple dimensions of self-concept? Whereas educational research has embraced a multi-dimensional perspective of self-concept with a particular emphasis on academic self-concept, personality research has continued to employ a uni-dimensional perspective of self-concept with a particular emphasis on global self-esteem. In support of a multi-dimensional perspective of self-concept based on a large ($N = 4,475$) sample of German adolescents, academic criteria are substantially related to academic self-concepts, whereas correlations between global self-esteem and all nine academic outcomes are close to zero ($r = -.03$ to $.05$). There is strong support for the discriminant validity of math and verbal self-concepts factors in that they are slightly negatively related to each other and have clearly contrasting patterns of relations with different academic outcomes – particularly coursework selection into advanced German, English, and mathematics courses. In contrast to self-concept measures, Big-Five and well-being personality factors explained only small amounts of variance in academic outcomes and support for their incremental validity after controlling for specific self-concept factors is weak.
Juxtaposition of Multi-dimensional Self-concept and Personality Constructs in Educational Settings: Construct Validity in Relation to Academic Outcomes

Costa and McCrae’s meta-theoretical framework of the structure of personality distinguishes between basic tendencies, such as the Big-Five (neuroticism, extraversion, conscientiousness, agreeableness, and openness) and surface characteristics, that include more malleable personality characteristics such as self-concept (see Shafer 2000). While personality traits are suggested to be stable, moderately hereditable and, to a certain degree, influential of behaviour across situational contexts, self-concept and other contextual influences are posited to have little or no effect on these basic tendencies (McAdams 1994). However, self-concept research has shown specific components, particularly those representing academic domains, to have important effects on academic achievement, possibly due to the fact that they are influenced by context, environment and life events (e.g., Bracken, 1996; Byrne, 1996a; Marsh, 1993). Thus, it appears that a relationship between academic self-concept and academic achievement exists, where cause and effect is attributed to both and thus both are affected if one is undermined (Marsh, Byrne & Yeung, 1999; Valentine, DuBois & Cooper, 2004).

While Costa and McCrae’s model and McAdams model of personality implicitly reject a reciprocal relationship between self-concept and personality, it seems likely that as personality affects specific components of self-concept the effects of significant life events, interventions, and environmental factors on personality factors may be mediated by self-concept. Whereas there is limited support for such a reciprocal and dynamic relationship, knowledge of the individual and combined influences of the effect of personality factors and self-concept on important dimensions of human experience, for example academic achievement, may allow for future research to explore the nature of this relationship. This is an important first step, from which panel data can be used to test the direction of the relationships hypothesised by theories such as McCrae and Costa’s (1996) and explore the nature of any reciprocal effects that may be present.

Surprisingly, despite the central importance of both the Big-Five personality traits and self-concept the two are rarely considered in the same study and when they are considered it is usually a single score global measure of self-esteem that is used. The results of this limited research suggest moderate negative relationships between self-esteem and neuroticism and slightly weaker relationships between self-esteem and extraversion (see Francis & James 1996; Furr & Funder 1998; Judge, Erez et al. 2002). Watson, Suls and Haig (2002), in their review, found moderate to weak relationship between self-esteem and the other components of the Big-Five. Very little research has explored a domain specific construction of self-concept in relation to the Big-Five. Asendorpf and Van Aken (2003) one of the few to do research in this area found that social self-concept was most closely related to extraversion and self-esteem was most closely related to neuroticism. In general it seems that we will not understand the true nature of the relationship between self-concept and the Big-Five until a well developed multi-dimensional measure of self-concept is used to relate the two constructs.
Both self-concept and personality trait research suggests that both constructs need to be evaluated from a multi-dimensional perspective. However, little research has evaluated the differential effects of these constructs on important human experience, such as academic achievement, from a multi-dimensional perspective. The present investigation aims to explore these effects with the view of gaining a better understanding of how personality at large drives achievement within school settings.

**Basic tendencies**

There appears to be an overwhelming consensus that personality is multi-dimensional and that there is no known global component that can adequately explain personality in its totality. Further, there is growing agreement within the research community that the Big-Five personality traits provide a common currency (Funder, 2000) or a type of “latitude and longitude” along which all-new personality constructs should be mapped (Ozer & Reise, 1994, p. 361). Research suggests that the Big-Five are relatively enduring, evident in a wide range of behaviours, present across age, gender, race, culture and language, and are possibly biologically and hereditarily based (Costa & McCrae, 1992a). Interestingly, gender differences on the Big-Five tend to be small, with women reporting slightly higher levels of neuroticism, agreeableness and conscientiousness and men slightly higher levels of openness (Costa & McCrae, 1992b, Costa, Terracciano & McCrae, 2001; Rubinstein, 2005). Based on these findings, particularly those relating to the biological and hereditary bases of the Big-Five, McCrae and Costa (1996, pp. 66-68) have argued for the Big-Five to be considered as the “true core of the individual”.

Support for the Big-Five has come from researchers of a variety of theoretical orientations, and links have been established with major personality instruments (Buss, 1996). While there is some disagreement over the number of basic factors (see Eysenck, 1991) research is now converging on the Five-Factor model (Costa & McCrae, 1992c). Although the Big-Five has received criticism on the basis that it cannot adequately explain the richness of personality functioning (see McAdams 1994), Watson, Suls and Haig (2002) have shown that the Big-Five is remarkably robust across self-report and peer report, children and adults and across different languages, nationalities and cultural groups. Consequently, although the Big-Five may not be able to explain the entire complexity of personality, it has provided strong stability and predictive validity that has given rise to a substantial amount of research (see McCrae & Costa, 1999).

**Self-concept**

While the multi-dimensionality of personality traits appears to be self-evident, the multi-dimensionality of self-concept appears to have been ignored by the wider personality psychology community. Indeed, Shafer (2000) has noted that when a self-concept measure is included, in research with other personality constructs, it is most often a single global measure of self-esteem. This appears to be quite peculiar as a
multi-dimensional view of self-concept was originally held by William James (1980/1963). Despite this pioneering work by James, self-concept research was dominated by a uni-dimensional perspective, which represented judgments about the self by a single score (e.g. Coopersmith, 1967; Rosenberg, 1979). These global judgments referred to as general self-concept, global self-worth, or self-esteem usually pertain to judgments about the self that have no reference to specific domains.

As a response to the little known about self-concept prior to the 1970’s, researches such as Wylie (1979) and Shavelson, Hubner and Stanton (1976) aimed to integrate what self-concept thinking into testable theories and definitions. In one of the most influential papers Shavelson, Hubner and Stanton (1976) developed a multi-dimensional, hierarchical model of self-concept (see review by Marsh and Hattie 1996). Research on Shavelson et al.’s model has suggested that the hierarchy is weak with specific components within higher order factors of academic and non-academic self-concept being highly differentiated (Marsh & Craven, 1997) and that this continues to become even more differentiated with age (Marsh, Craven & Debus, 1998; Marsh, Debus & Bornholt, 2005). These results have cast doubt over the usefulness of any global component of self-esteem in explaining variance within specific domains and suggests research would benefit from addressing components of domain specific self-concept that relate most logically to the aims of the particular research project (Marsh, 1993; Marsh & Craven, 1997). Thus Marsh and Craven (1997) argued that specific domains of self-concept allow for a more thorough understanding of the self across contexts, are better able to predict behavior, better measure for the efficacy of treatment interventions and, provide the best context for integration with other constructs than any global measure of self-concept.

Educational research has shown that domain specific components of self-concept that pertain to academic criteria and not global self-esteem are substantially related to academic outcomes (Marsh, 1993). Subsequently, longitudinal research has suggested that the efficacy of academic self-concept in predicting diverse academic outcomes extends beyond that which can be explained by prior academic achievement. Again, self-esteem has little or no influence (Marsh, 1990a; Marsh, Byrne & Yeung, 1999). Further research on gender has suggested that the lack of variance across males and females on global self-esteem may be masked by counter-balancing of differences within the specific components of self-concept and that these differences seem to be relatively stable (Marsh, 1989). In general, the domain specific components of self-concept appear to be the most powerful for use within educational research and other practical research settings.

It is suggested that many areas of psychological research would benefit from using a multi-dimensional measure of self-concept, particularly research relating to educational settings. It is the aim of this research study to explore the unique and combined influences of multi-dimensional self-concept and the Big-Five on a diverse range of academic outcome criteria. In this study well-being is further used to clarify the unique and combined influences of self-concept and the Big-Five on academic outcomes as subjective well-being is reasonably strongly related to both self-concept (see Marsh & Yeung, 1999; Schwarz & Strack, 1991) and the Big-Five (see Diener, Suls, Lucas & Smith, 1999; McCrae & Costa, 1999) and should logically have some relation to academic outcomes although this relationship is most likely to be small. In
line with Diener et al. (1999) we have included separate measures of positive affect, negative affect and satisfaction with life.

Current study

Using confirmatory factor analysis it is shown that the German version of the SDQ III measures 17 distinct, *a priori*, self-concept factors and that the lack of gender differences in global self-esteem is masked by a counter-balancing of domain specific self-concept factors. In the paper a set of 17 self-concept factors, five personality factor and three well-being factors are related to a diverse set of nine academic outcome measures. It is suggested that the academic self-concept domains will be most strongly related to the academic outcomes they most logically relate too. Further, it is expected that the domains of self-concept that most logically relate to the different academic outcome measures will be able to account for substantially more variance within these outcome measures than the Big-Five, well-being and global component of self-esteem. Attention is then turned to a series of structural equation models to evaluate the extent to which outcome variance is uniquely explained by a set of self-concept factors, a set of personality factors and a set of well-being factors. It is argued that domain specific components of self-concept and instruments that measure multi-dimensions of self-concept are most appropriate for educational research.

Methods

Sample

The data for this research is part of a wider, ongoing German study, Transformation of the Upper Secondary School System and Academic Careers (TOSCA), conducted by the Max Planck Institute for Human Development, Berlin, and the Institute for Psychology II at the University of Erlangen-Nuremberg. Four thousand, four hundred and seventy five students (45% males) were randomly selected from 149 randomly selected secondary schools in the state, up to 40 students from each school. The participation rate was 99% of school and 80.2% of students. The TOSCA is comparative to other international student assessment (e.g. OECD, 2001) and provides a better database than typical convenience samples. The students were in their final year of upper-secondary school (typically 17-19 years of age) at the end of which they obtain the school-leaving certificate, which, allows students to attend university subsequently. The test battery was administered in each school between February and May, 2002 by two trained research assistants.

Instruments

*Self Description Questionnaire (SDQ) III.* The SDQ III (Marsh, 1992; Marsh & O’Neill, 1984) a multidimensional self-concept, for late adolescents and early adulthood, is one of the strongest multi-dimensional instruments available for this age
group (see Byrne, 1996b; Hattie, 1992; Wylie, 1989). Reliability of each subscale typically ranges of .80s to low .90s and external validity has consistently been found with ratings by significant others, academic achievement, age, gender, locus of control as examples. Further factor analysis has consistently supported the a priori factor structure of the SDQ III (Marsh, 1990b, 1992, 1993; Marsh & Craven, 1997).

The German adaptation of the SDQ III (Schwanzer, Trautwein, Lüdtke & Sydow, in press) was translated from the original items, independently, by four researchers with English as a second language. Emphasis was placed on using simple common words that could easily be understood by students. With the help of professional translators the most appropriate translation was chosen and refined. This was followed by extensive pilot testing resulting in a short German instrument with four items per sub-scale on a four-point (disagree–agree) response format. The items chosen met two conditions: (1) items particularly for the academic and performance-oriented scales, focused on competency (e.g., “I’m good at mathematics”) rather than on the affective evaluation of the specific domain (e.g., “I like mathematics”) and (2) factor analyses in pilot research, showing that the selected items had the highest factor loadings on their respective factor.

Five additional scales were included that specifically related to the transition from school to work or further education for use in a longitudinal study. The intellectual self-concept scale, focusing on general perceptions of being intellectual replaced the academic self-concept scale that focused on specific school subjects. The impetus for an artistic self-concept scale was due to the influence of Vispoel (1995; also see Marsh & Roche, 1996), who showed that artistic self-concept was clearly differentiated from other components of self-concept measured by the SDQ. With the emergence of adulthood giving rise to the opportunity to vote and the central importance of politics in Germany a political self-concept was included. The technical self-concept was included to balance the emphasis of purely academic areas of self-concept that strongly relates to aspects of certain future careers that the academic domains of self-concept cannot. The technical self-concept refers to an individual’s perceptions of their ability to problem solve in relation to machines and technical equipment. Finally the computer self-concept reflects an individual’s impressions of basic computer skills that are important to a variety of academic and workplace careers. The German adaptation of the SDQ III can be distinguished into two broad higher order factors including non-academic (social, religious) and academic, including existing scales (verbal, maths) and those added in the German adaptation (intellectual, artistic, political, technical and computer). This distinction is consistent with the Shavelson et al. (1976) model and consistent with previous research it is expected that domains within these two factors will be highly differentiated.

**NEO-FFI (Five Factor Inventory).** The Big-Five personality factors were measured with the German version (Borkenau & Ostendorf, 1993) of the NEO-FFI (Costa & McCrae, 1989), a 60-item short form of the NEO Personality Inventory (Costa & McCrae, 1992c) Reliability and validity evidence for the FFI is strong, as the five 12-item FFI scales are highly related to the corresponding scales on the full NEO-PI (Costa & McCrae, 1989) and the German translation has been shown to have high reliability, validity, and comparability with the English original (e.g., Borkenau & Ostendorf, 1993).
**Positive and Negative Affect Schedule (PANAS).** The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) consists of 20 adjectives, 10 measuring dispositional negative affect, and 10 that measure dispositional positive affectivity. Responses on a 5-point scale indicate the amount of time spent experiencing each emotion in the last six months. The present investigation used the German translation which has been shown to display both high reliability and validity (Krohne, Egloff, Kohlmann and Tausch 1996).

**Satisfaction With Life Scale (SWLS).** The Satisfaction With Life Scale (Diener, Emmons, Larsen, & Griffin, 1985; Pavot, Diener & Suh, 1998) is a brief, one-dimensional global measure of cognitive and global evaluations of life satisfaction. The German adaptation of this instrument (Trautwein, 2004) consists of four items with a four-point (disagree–agree) response format shown to have good reliability and validity.

**Academic outcome measures.** The mathematics achievement test consisted of original items from the Third International Mathematics and Science Study (TIMSS; e.g., Baumert, Bos & Lehmann, 2000). A total mathematics achievement score was constructed using the original metric of the TIMSS study. The English achievement test was based on the Test of English as a Foreign Language (TOEFL), which was constructed by the Educational Testing Service (ETS; 1997). The present one-hour short version of the test was based on an older TOEFL test that is used in Institutional Testing Programs (ITP). In a validation study with 171 students from upper-secondary schools, both the short version and a recent ITP-TOEFL were administered. The results showed a high correlation (.88) between the two versions (Köller & Trautwein, 2004). An additional third achievement indicator, the *Abiturgesamtnote* (similar to overall Grade Point Average and referred to as such hereafter) was obtained from school records. Furthermore, students reported their school grades in mathematics, English and German from their midterm report card. Finally, students were asked to indicate whether they took an advanced course in mathematics, German, and/or English. All students had the opportunity to select at least one of these three courses. This academic outcome criterion was included due to Köller, Daniels, Schnabel and Baumert (2000) research that demonstrated that course selection is based on a combination of academic achievement, self-concept, and interest in different school subjects.

**Statistical Analyses**

Structural equation modeling (SEM), using LISREL 8.54, with maximum likelihood estimation was conducted (see Bollen, 1989; Byrne, 1998; Joreskog & Sorbom, 1993 for discussion on SEM). Due to the large scale of the study, missing data potentially presents a problem, however, in this case the effect of missing data was likely to be small as missing responses only accounted for 2.4% of the total data set. Despite this full-information-maximum-likelihood (FIML) approach to missing data was emphasized. This technique has advantages over traditional listwise deletion, pairwise deletion, mean substitution and regression substitution methods. It also has the advantage of combining parameter estimation and missing data problems into a single step resulting appropriate parameter estimates and standard errors (e.g. Allison, 2001). This technique has the advantage of representing the entire sample rather than...
just those with no missing data, which is important for large-scale studies that are intended to represent the larger population, such as the present study. Due to the small amount of missing data all approaches explored, resulted in similar conclusions therefore it is unlikely that the choice of technique would be a critical one.

Of the variety of indexes representing goodness of fit, this study emphasized the root mean square error of approximation (RMSEA) with the 90% confidence intervals, as this is the index that is most appropriate to FIML approaches to missing data. Also presented is the chi-squared, \( df \) and evaluative parameter estimates for each alternative model. It must be noted that the evaluation of the best model is ultimately a subjective decision, with indexes of fit used as a guide, thus parameter estimate evaluation is the focus of this paper.

The CFAs were conducted on 110 variables representing 35 latent variables. Due to the number of items, item parcels were used for the NEO-FFI and the PANAS reducing them to four items per factor, which was in line with the 17 self-concept factors and the single satisfaction with life scale. Gender and the nine academic outcomes were based on a single item that was assumed to be measured without measurement error, thus the standardized factor loading was one.

Students within each school are likely to be more homogeneous than a completely random sample, which may increase the chance of Type I error. However given that the sample size is large, small differences in standard error is unlikely to be a problem. Further, as this study emphasizes parameter estimates and not mean differences the chance of type one error due to homogeneity of sub-samples is reduced. Generally, variance in self-concept due to differences between schools has been shown to be small (Marsh & Rowe, 1996; Marsh, Hau & Kong 2002). However to address any problems between-class differences were controlled in a pooled-within class covariance matrix, where means were centered to the mean of the class from which the case came, thus all school-to-school variation was removed.

Results and Discussion

Separate CFAs were fitted for the 17 self-concept factors and the five NEO-FFI factors and the three well-being factors combined. The fit for the 17 self-concept factors (RMSEA = .0353, upper confidence interval of .0347 and lower confidence interval of .0358; chi-square \( df = 2074 \) = 13607) was better than the eight combined personality factors (RMSEA = .0539, upper confidence interval of .0527 and lower limit of .0551; chi-squared \( df = 436 \) = 6093). Note that RMSEA index scores of under .05 are considered to be an excellent fit for the data and .08 an acceptable fit. Correlations are based on an overall CFA whose parameter estimates were almost identical for these sub-models. An overall CFA on the 35 latent factors (17 SDQ III, 5 NEO-FFI, 3 well-being, 1 gender and 9 academic outcomes) resulted in a good fit (RMSEA = 0.036, confidence interval upper limit of 0.0322 to a lower limit of .0329, chi-squared \( df = 5300 \) = 30452). The fit of this overall model is especially good considering the size of the model and the fact that each variable was constrained to have a zero factor loading with all but the factor it was designed to measure, and all uniqueness terms were constrained to be uncorrelated.
The CFA results indicate all 17 self-concept factors were well defined. One hundred and thirty six correlations among the 17 factors ranged from -.29 to .82 (M = .14; SD = .17). The correlation between math and verbal were the most negatively correlated. Despite all scales being positively oriented and corrected for measurement error all 17 factors were clearly distinct with an average correlation of only .14. Self-esteem was substantially correlated with several factors, however the majority were less than .2 and several close to zero. These results support the multi-dimensional perspective of self-concept and that a global factor cannot adequately represent the variance in self-concept. The CFA results also suggest that the five NEO-FFI factors and the three well-being factors were well-defined, with correlations not exceeding .69 regardless of direction (M = .04, SD = .35). The largest correlations were between neuroticism and negative effect (.69) and extraversion and positive affect (.60). Though these correlations were substantial it was not considered reasonable to combine any factors.

Girls had slightly lower self-esteem than boys (difference $r = .09$) consistent with earlier research (Marsh, 1989). This difference was consistent across all 17 factors, however the standard deviation was substantially high, .20, with correlations ranging from -.43 to .25, thus providing some support for the masking of gender differences due to counter-balancing of specific components of self-concept. Girls had lower physical, emotional stability, self-esteem, math, problem solving self-concepts, technical, computer, and political but significantly higher opposite sex, honesty/trustworthiness, artistic and verbal self-concepts. The largest disadvantage for girls were the new scales of technical ($r = -.43$), computer ($r = -.43$), and political ($r = -.32$) and the greatest advantage was for artistic self-concept ($r = .25$). These results provide further evidence for the use of a multi-dimensional perspective and instrumentation within educational settings. Gender differences for the Big-Five and well-being were small.

A path analysis relating the 17 self-concept factors, the Big-Five factors and the three well-being factors was used to predict each of the academic outcomes. Consistent with Marsh and Craven (1997), the results suggest that components of self-concept not logically related to the academic outcomes did not predict those outcomes very well. Self-esteem was consistently small with path coefficients ranging from -.13 to .06 with a mean of -.07. Only six non-academic self-concept factors had path coefficients above .1 and all were negative relations with opposite-sex self-concept. Parent self-concept and honesty/trustworthiness had the highest positive coefficients with the academic outcomes but these did not pass .1. Further when paths take into account all 25 predictor factors no combination of non-academic self-concept factors had coefficients above .2.

Again, Consistent with Marsh and Craven (1997) those self-concept factors most logically related to academic outcomes predicted those outcomes better than either self-esteem or non-academic components of self-concept. Again, these results are based on correlations and coefficients that take into account the variance explained by all 25 predictor variables. As would be expected, math self-concept was highly positive in its relation to math grades ($r = .71$, PC = .77), math achievement ($r = .59$, PC = .54) scores and total GPA ($r = .45$, PC = .53) and in line with Marsh and Craven (1997) math self-concept did not relate highly to English standardized test scores ($r = .01$, PC = .08), school grades in English ($r = .06$, PC = .23) and German ($r$...
= .11, PC = .21), or taking advanced courses in English (r = -.27, PC = -.20) and German (r = -.26, PC = -.17). Evidence for the use domain specific components of self-concept which are most logically related to the factor of interest comes from looking at converse set of relationships with verbal (German) self-concept and the academic outcomes. Verbal self-concept was highly positively related to school grades in German (r = .51, PC = .52), English (r = .44, PC = .51), English standardized scores (r = .38, PC = .43) and taking advanced courses in both German (r = .29, PC = .18) and English (r = .23, PC = .21) and total GPA (r = .45, PC = .53). Verbal self-concept was also found to be low and often negatively related to math school grades (r = -.10, PC = .11) and taking advanced math courses (r = -.38, PC = -.22).

The patterns of relationships of math self-concept with the academic outcomes is mirrored to a lesser degree by technology and computer self-concept and the pattern in relation to verbal self-concept is reflected by artistic and possibly political self-concept. Relationships with advanced courses in math, English or German seems to be highly dependent on whether one is high in verbal self-concept or math self-concept intelligence and problem solving self-concept is not highly related to any of these advanced courses.

Relationships between the Big-Five, well-being and the nine academic outcomes measures did not emulate the sometimes substantial relationship of self-concept with the academic outcomes. Only 12.5% of the 40 correlations were above .20 regardless of direction. Logically openness or intellect related modestly with several academic factors, particularly English and German grades and English standardized test scores but not math or taking advanced math subjects scores. This suggests that openness reflects verbal rather than a math orientation. However, math is more positively correlated than English scores in relation to conscientiousness. Both openness and conscientiousness were similarly related to GPA (.20 and .19 respectively). Correlations and path coefficients for all 25 predictor variables against the nine academic outcome measures are presented in Table 1.

Table 1: Latent variable correlations and path-coefficients predicting variance in the academic criteria.

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<td>-.03</td>
<td>-.02</td>
<td>.01</td>
</tr>
<tr>
<td>PC</td>
<td>-.03</td>
<td>-.02</td>
<td>.01</td>
</tr>
</tbody>
</table>

Table 1: Latent variable correlations and path-coefficients predicting variance in the academic criteria.
Gender

Note. Each academic outcome is represented by a first letter denoting the subject matter (M = math, E = English, G = German; Ach = standardized achievement tests), followed by a three-letter abbreviation (Adv = advanced course selection, Grd = Grades in school; See Appendix for a summary of the factors). $r$ = correlation coefficient. PC = path coefficients in path model relating the set of 17 self-concept, 5 personality, and 3 well-being factors to each outcome variable. Mult $R^2$ = squared multiple regression coefficient. All parameters are presented in completely standardized format. For the solution based on all 110 indicators of self-concept, personality, gender and academic outcomes, the solution was fully proper and the goodness of fit for this model was acceptable [Full Information ML Chi-Square Full Information ML Chi-Square ($df = 5300$) = 30452, RMSEA = 0.0326; 90 Percent Confidence Interval for RMSEA = .0322 - .0329].

To clarify the relationship and determine the amount of variance accounted for by self-concept, Big-Five, well-being on academic outcome measures a series of analysis were run where self-concept and self-esteem predicted variance in the academic outcomes (analysis 1), the Big Five and well-being factors predicted variance in the academic outcomes (analysis 2), and all self-concept, self-esteem, Big Five and well-being variables predicted variance in the academic outcomes (analysis 3). Unique and total variance accounted for by the various constructs is presented in Table 2.

Table 2: Percentage of variance accounted for.

<table>
<thead>
<tr>
<th>Academic outcomes</th>
<th>Analysis 1</th>
<th></th>
<th>Analysis 2</th>
<th></th>
<th>Analysis 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Scon</td>
<td>Sest</td>
<td>Total</td>
<td>Big5</td>
</tr>
<tr>
<td>Math Test</td>
<td>40.3*</td>
<td>40.0*</td>
<td>0.0</td>
<td>7.0*</td>
<td>6.0*</td>
</tr>
<tr>
<td>English Test</td>
<td>25.4*</td>
<td>25.3*</td>
<td>0.0</td>
<td>10.4*</td>
<td>9.9*</td>
</tr>
<tr>
<td>Math Coursework</td>
<td>32.9*</td>
<td>32.8*</td>
<td>0.0</td>
<td>6.6*</td>
<td>6.0*</td>
</tr>
<tr>
<td>English Coursework</td>
<td>12.0*</td>
<td>12.0</td>
<td>0.1*</td>
<td>1.1*</td>
<td>1.0*</td>
</tr>
<tr>
<td>German Coursework</td>
<td>14.1*</td>
<td>14.1</td>
<td>0.0</td>
<td>4.7*</td>
<td>3.9*</td>
</tr>
<tr>
<td>Math Grades</td>
<td>55.9*</td>
<td>55.9</td>
<td>0.1*</td>
<td>9.4*</td>
<td>7.7*</td>
</tr>
<tr>
<td>German Grades</td>
<td>36.4*</td>
<td>36.4</td>
<td>0.1*</td>
<td>16.7*</td>
<td>1.4*</td>
</tr>
<tr>
<td>English Grades</td>
<td>31.7*</td>
<td>31.7</td>
<td>0.1*</td>
<td>9.8*</td>
<td>1.7*</td>
</tr>
<tr>
<td>Overall Grades</td>
<td>43.9*</td>
<td>43.9</td>
<td>0.1*</td>
<td>13.9*</td>
<td>2.1*</td>
</tr>
<tr>
<td>M</td>
<td>32.5</td>
<td>32.4</td>
<td>0.1</td>
<td>8.8</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Note. Total = total variance explained in the academic criteria by all constructs in the study, Scon = Unique variance explained by Multidimensional self-concept, Sest = Unique variance explained by Self-esteem, Big5 = Unique variance explained by Big-Five personality factors, Well = Unique variance explained by Well-being (positive affect, negative affect and life satisfaction). * p < .05. SEM was used to evaluate the amount of unique and total in the academic criteria by self-concept, self-esteem, Big-Five and well-being and the amount of unique and shared variances.
In the first analysis almost all of the total variation across all nine academic outcome criteria ($M = 32.5\%$) was explained by self-concept ($M = 32.4\%$). Self-esteem ($M = 0.1\%$) did not exceed 0.1\% of total variance in any of the nine academic criteria. These results suggest again that a single global measure of self-esteem cannot be considered to be adequate in explaining the academic outcomes whereas the multi-dimensional self-concept measures that relate to academic domains provide a much better explanatory framework in explaining academic outcomes.

In the second analysis, total variance explained by both the Big-Five and well-being ranged from 1.1\% to 16.7\% with a mean of 8.8\%. The Big-Five explained much more variance ($M = 7.8\%$) than well-being ($M = 1.0\%$). Overall it appears that the Big-Five is only modestly useful in explaining variance across most of the diverse set of academic outcome measures.

In the third analysis, all 16 self-concept factors, one self-esteem measure, the Big-Five personality traits and three well-being factors were included in one analysis. The total variance in the nine academic outcomes explained by the 25 factors ranged from 12.3\% to 57.5\% with a mean of 34.1\%. It is interesting to note that the total variance in this analysis is only 1.6\% more than the first analysis with only self-concept and self-esteem as predictive factors. Further in this analysis self-concept explained the majority of the variance (ranging from 8.7\% to 47.8\%, $M = 23.9\%$). Self-esteem and well-being contribute little to the total variance with means of 0.1\% and 0.3\% respectively (self-esteem ranged from 0.0\% to 0.3\%; well-being ranged from 0.0\% to 0.8\%). While, the Big-Five did explain a small amount of variance in all of the education criteria (from 0.6\% to 3.8\%, $M = 1.8\%$). Further, comparison with analysis one and two suggests that there is a modest overlap with self-concept and the Big-Five with self-concept explaining 31.8\% in analysis one and 23.9\% in analysis three. This suggests that 23.9\% of variance explained by self-concept is unique and that much of the variance explained by personality and well-being in analysis two can also be explained by self-concept (mean total variance in analysis two for the Big-Five 7.8\%; mean total variance for Big-Five in analysis three 1.8\%).

**General Discussion.**

Analysis of correlation, path coefficients and total mean variance suggests that self-concept is strongly related to various academic outcomes, and that the relationship between those outcome measures and self-esteem and well-being is trivial. Further while the Big-Five was modestly related to the nine academic outcomes much of the variance explained by this construct could also be explained by self-concept. Further self-concept uniquely explained a substantial amount of variance in the nine academic outcomes.

The results do provide some support for the idea that the lack of gender difference in self-esteem is due to a difference in the pattern of self-concept component results for boys and girls, with boys being higher on some and lower on others and vice versa. Important to the aims of this research, academic components of self-concept, including the new measures of computer, technical, political and artistic
self-concept, provided some of the largest differences across gender. This suggests that researches and practitioners within academic settings need to take gender differences into account when considering the impact of self-concept upon academic achievement and outcomes.

This pattern of results provides several lines of evidence for the importance of a multi-dimensional perspective of self-concept. Firstly, the domain specific components of self-concept explained substantially more variance than the Big-Five and well-being personality factors. More importantly the lack of variance explained by self-esteem suggests that a single component of variance cannot be considered to adequately represent the multi-dimensions of self-concept. Further, the substantial relationship between math self-concept and math academic outcomes juxtaposed against the low and sometimes negative relationships with language based academic outcomes (see also the opposite relationship with verbal (German) self-concept), is representative of the highly differentiated nature of self-concept. These results provide further support for Marsh and Craven (1997) who suggested that the most appropriate components of self-concept for research are those that are most logically related to the aims of that project.

While this research does not cast doubt on the usefulness of the Big-Five and subjective well-being in many important areas of human experience it does cast doubt on their usefulness in academic areas of the educational setting. While these factors and those non-academic components of self-concept may be useful in explaining variance within areas of the educational setting that are not uniquely academic, it seems that academic factors of self-concept are most appropriate in these settings. Further, given the highly differential nature of academic components of self-concept, interventions focused on a specific subject should target the self-concept factor that most strongly relates to that subject area. Further, it is suggested that educational interventions that target self-esteem should be more specific in what areas of self-relevant evaluation they are trying to affect and use the academic self-concept measures that most logically relate to these specific areas as these results suggest that general self-esteem does not provide an adequate explanation of the variance between individuals anymore than general ratings of likableness explain variance in personality.

This research in a German context is unique in that a wide range of academic criteria have been used to relate a multidimensional measure of self-concept to academic outcomes in a non-English speaking context. Further, the diverse nature of the academic outcomes including academic selection variables allows a unique look not just at how students’ self-concept affects academic achievement but also the way they think about those subjects. These results provide support for the cross-cultural, generalizability of findings in English speaking contexts as these results are in line with existing self-concept research. However, one should consider that there is likely to be some differences in the importance of some subjects and self-concept measures in the German context, particularly given the likely differences in the importance of political self-concept in English speaking contexts like Australia compared to the context of the current research.
References


