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The 'About Me' Questionnaire: Factorial Structure and Measurement Invariance

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Abstract: The About Me Questionnaire (AMQ; Maras, 2002) has been used to measure components of social identity, academic self-concept and self-worth in children and adolescents in the UK and abroad. Studies have reported simple reliability statistics but a comprehensive assessment of the scale's psychometric properties has not been conducted. Confirmatory factor analysis, using a sample of 5082 children aged 6-18 years from combined datasets of five cross-sectional research studies, was employed to establish the psychometric soundness of the 29-item AMQ. Analysis revealed generally adequate reliability with the seven factor structure confirmed in a replication sample. Results provide evidence of adequate psychometric properties, optimised with the omission of reverse coded item and selected items, suggesting it is suitable for assessing social identity and academic self-concept of children and adolescents in applied settings. Tests for measurement invariance showed that the assessment of parallel constructs was strongly supported across males and females and partially supported across primary and secondary school age groups.

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Abstract

The About Me Questionnaire (AMQ; Maras, 2002) has been used to measure components of social identity, academic self-concept and self-worth in children and adolescents in the UK and abroad. Studies have reported simple reliability statistics but a comprehensive assessment of the scale's psychometric properties has not been conducted. Confirmatory factor analysis, using a sample of 5082 children aged 6-18 years from combined datasets of five cross-sectional research studies, was employed to establish the psychometric soundness of the 29-item AMQ. Analysis revealed generally adequate reliability with the seven factor structure confirmed in a replication sample. Results provide evidence of adequate psychometric properties, optimised with the omission of reverse coded item and selected items, suggesting it is suitable for assessing social identity and academic self-concept of children and adolescents in applied settings. Tests for measurement invariance showed that the assessment of parallel constructs was strongly supported across males and females and partially supported across primary and secondary school age groups.

Keywords: Peers, Family, School, Validity, Reliability, Social Identity, Academic Self Concept

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Background

Psychological, cognitive and physical changes throughout childhood give rise to the development of social-identity, a critical social-psychological process that reflects an individual's knowledge of, their associated value with, and perceived significance of membership to specific social groups (Erikson, 1968). Social identity plays a significant role in the development of an individual's self-worth and is associated with long-term physical and mental health outcomes (Haslam, Jetten, Postmes, & Haslam, 2009), behavioural engagement (Tyler & Blader, 2003) and inter-personal relationships (Yampolsky & Amiot, 2013). Subsequently, the development of social identity during childhood and adolescence is of significant interest to researchers and there is a need for reliable instruments to measure this.

Social Identity Theory (SIT: Tajfel & Turner, 1979) proposes that an individual's self-esteem is largely rooted in their social identity with various institutions and groups. Two cognitive processes, self-categorisation and social comparisons, influence this bidirectional relationship (Schmitt, Branscombe, Silvia, Garcia & Spears, 2006). According to SIT, an individual is able to categorise the self in relation to other social classes or groups across a variety of social contexts. Comparisons made between the self and other people lead to the formation of in-group (share similar attributes) and out-group (markedly different) membership. Consequently, self-categorisation results in an enhanced perception of the similarities within in-group members, and further exacerbates the differences for out-group members. This social comparison process results in a selective application of accentuation effects that serve to benefit the individual. Evidence supports SIT indicating that a strong

identification with a social group facilitates the formation of social identity and promotes general well-being and high levels of self-esteem (Stets & Burke, 2000).

While social identity is a developmental process, evidence suggests that adolescence is the most salient period in which group behaviour is at its most influential (Palmonari, Pombeni & Kirchler, 1990). Group identity is a dominant theme at this time due to a progressive period of self-searching that accompanies biological, psychological and cognitive changes (Brown & Lohr, 1987). As the need to belong intensifies from childhood to early adolescence, a visible shift in an individual's interpersonal relationships can often be identified during specific transition periods, such as the transition to secondary school. During this period an individual typically reports a decline in identification with family members but an increase in identification with peers (Tanti, Stukas, Halloran, & Foddy, 2011). This interactive relationship is thought to be as a consequence of increasing independence and skills during the pathway to adulthood, and the exploration of different social roles amongst different social groups (Gutman & Eccles, 2007). In sum, peer group memberships, and the status that is attached to them, are seen as the focal point in defining an individual's identity (Newman & Newman, 2001). Consequently, peer group membership predicts a wide range of short and long-term outcomes for effective social, emotional and behavioural functioning (Tarrant, 2002; Espelage, Holt, & Henkel, 2003; Buhs, Ladd, & Herald, 2006).

In addition to one's identification with peers and family groups, an individual's identification with school has a substantial impact upon their level of functioning, particularly upon their long-term prospects and general self-worth (Turner, Reynolds, Lee, Subasic, & Bromhead, 2014). While strong identification can harbour positive attitudes towards education and positively influence academic performance, success

within education also requires a requisite amount of effort and interest in school-work that can often be associated with negative feelings, and at certain times experience of failure (Wang & Eccles, 2012). At a superficial level an individual's identity with school is influenced by their experience of interpersonal relations with peers and teachers. However, at a more detailed analysis school identity is influenced by an individual's ability to deal with criticism and evaluation, their ability to handle challenges, and their own knowledge of their competencies and overall intelligence (Bizumic, Reynolds, Turner, Bromhead, & Subasic, 2009). It could be suggested that this relationship is cyclical; poor identification with school predicts less effort, poor academic competence and less interest in academia. Likewise, a lack of competency, a disregard for academia and less effort amount to less identification with school.

In summary, the group that an individual identifies with, whether it be school, family or peer groups, and their subsequent attitude towards education, appears to play a key role in determining social identity and the understanding of one's self. The influence of social groups on one's identity can influence the trajectory of a child's development into adulthood, and thus predict a number of behavioural outcomes, including the ability to cope with developmental problems (Palmonari, Pombeni, & Kirchler, 1990). Due to its dominant presence during key developmental milestones, a tool measuring one's concept of social identity in relation to family, school and peer groups, has potential to predict and explain a variety of social behaviours and problems.

Current Measures of Social Identity in Childhood and Adolescence

Several tools have been developed to assess social identity during adolescence. The U-MICS (Crocetti, Rubini, Luyckx & Meeus, 2008; Crocetti, Schwartz, Fermani, Meeus, 2010) is a 13 item questionnaire that assesses three identity processes

(commitment; in-depth exploration and reconsideration of commitment) in adolescents samples aged 11 to 19 years. It has been validated in seven European countries and found to have good internal consistency (Dimitrova, Crocetti, Buzea, Jordanov, Kosic, Tair *et al.*, 2015). The Social and Personal Identities Scale (SIPI: Nario-Redmond, Biernat, Eidelman & Palenske; 2004) measures self-reported social and personal identifications with both ascribed and achieved group memberships in areas related to family, ethnicity, gender, place of origin, as well as other social affiliations (e.g., teams, clubs, major fields of study). CFA validates the use of the SIPI in adult samples (Nario-Redmond et al., 2004) but the use of the measure in younger samples is undocumented. A third measure, the Aspects of Identity Questionnaire (AIQ-111x), developed by Cheek, Tropp, Chen & Underwood (1994), is often used to measure personal, social and collective identity in late adolescent samples. Since the AIQ-IIIx was developed for college students, the use of language in the scale, statements and abstract concepts about 'the self' and 'salient others' mean it is inappropriate for use with children and young adolescents.

One way of measuring social identity in primary school age children, without using complex language and abstract concepts, would be to assess peer group identity in relation to in-group and out-groups. Duffy and Newsdale (2008) used a social network assessment measure (Cairns, Cairns, Neckerman, Gest & Gariepy, 1988) paired with a measure of social group constructs which assessed group norms and intragroup position to determine which groups children aged 8 to 13 years felt they, and other members of their class, belonged and identified themselves with. The difficulty with this methodology is that one can only measure peer group social identity rather than relational identity with other salient social groups that children may feel they belong to, such as family or school.

Thus, the assessment of primary and secondary school aged children's social identity in academic settings seems largely neglected. One exception to this is the 'About Me Questionnaire' (AMQ; Maras, 2002), a 29-item scale designed to measure adolescents' self-perceived identification with seven distinct factors (peers, family, school, academic competence, academic effort, academic importance and general self-worth).

The AMQ was originally developed on the backbone of extensive research with adolescent populations (Maras, Brosnan, Faulkner, Montgomery & Vital, 2006; Maras, Carmichael, Patel, & Wills, 2007; Maras, 2007). Earlier versions of the AMQ appeared as part of a larger questionnaire, the Aspirations for Higher Education Questionnaire (AHEQ; Maras, 2002). However, 29-items relating to social identity and academic self-concept were extracted from the AHEQ in 2007 when the AMQ was used as a standalone measure for the first time. Since then, the AMQ has been used both nationally and internationally within adolescent research i.e. the UK (Maras, Brosnan, Faulkner, Montgomery & Vital, 2006; Maras, Carmichael, Patel, & Wills, 2007; Maras, 2007; Knowles & Parsons, 2009), Australia (Bornholt, Maras & Robinson, 2009) and China (Maras, Moon & Zhu, 2012).

To date, the AMQ has evidenced adequate internal consistency (Maras, Moon & Zhu, 2012) with some evidence of discriminant validity via correlations with behavioural screening tests such as the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), measures of attributional style (Seligman, Abramson, Semmel, & von Baeyer, 1979) and academic motivation (Vallerand, Pelletier, Blais, Brière, Senecal, & Vallieres, 1992). Few if any studies, however, have provided a comprehensive assessment of the AMQ's psychometric properties within a confirmatory factor analysis (CFA) framework.

The purpose of this study was therefore to provide a more in-depth assessment of the AMQ as a psychometrically sound measure of children's social identity and self-concept than currently exists. Confirmatory factor analysis (CFA), using a cross-validation procedure, will be used to provide an assessment of the AMQ's dimensional structure and identify potentially poor performing items. In addition, measurement invariance across gender and age groups will be conducted. This will help to assess whether the AMQ measures children's self-concept and social identity equivalently for males and females and primary and secondary age groups to help assess its suitability for use in these populations (Brown, 2006). Assessing reliability within a CFA framework also provides a more accurate reliability estimate than traditional methods such as Cronbach's alpha, as it accounts for excessive similarity of item wording and other potential sources of inflation of reliability estimates (Raykov, 2001).

Method

Sample

The sample for the current study was derived by combining complete case data from five cross-sectional research projects conducted between 2005 and 2013 across South East London and Kent. The final sample consisted of 5082 children aged between 6 and 18 years (mean age = 13.23, *SD* = 1.70) of which 45% were male.

Measures

The 'About Me' Questionnaire (AMQ; Maras, 2002; Maras et al., 2006; 2007; 2012)

As noted previously, the AMQ is a research tool designed to assess children's social identity with several institutions including academia. The AMQ is comprised of 29

items, each scored on a 5 point Likert scale ranging from strongly disagree (1) to strongly agree (5) with the exception of item 5 which is reversed scored. The 29-items have previously been grouped into seven composite variables relating to an adolescents level of perceived social identity and self-concept (Table 1): Peer Identity (four items), Family Identity (four items), School Identity (four items), Academic Competence (four items), Academic Effort (four items), Academic Importance (four items) and Self-worth (five items). Completion of the AMQ typically takes 10 minutes.

Procedure

Across all five projects ethical approval was granted by the hosting institution's research ethics committee. Written informed consent was obtained from both the head teachers and the children themselves. Consenting participants were provided with an explanation into the nature of the study and informed that they reserved the right to withdraw without facing penalty. Paper copies of the AMQ were distributed to participants by researchers and were completed by all participants during school hours. Across all projects researchers were present during questionnaire administration to ensure that the participants knew how to answer the items on the questionnaire and were able to answer any questions that the participants may have had.

Statistical Analysis Plan

The factor structure of the AMQ was evaluated with confirmatory factor analysis (CFA) using the package *lavaan* in R (R Core Team, 2014). A cross-validation procedure was performed with data randomly split into separate testing and replication subsamples (N=2,547 for both). In the testing sample, the scale's factorial structure was assessed in a partially exploratory fashion within the CFA framework

(Brown, 2006), with model respecification performed when theoretical and statistical justification could be provided. In the replication sample, generalisability was assessed by examining the fit of the model emerging from the analysis in the testing sample. Finally, a CFA on the full sample was conducted to examine whether the measurement properties of the scale were invariant in males and females and across primary and secondary school level age groups.

Input data was the sample variance-covariance matrix (see Appendix 1 for sample correlations with means and SDs), with maximum likelihood estimation used to estimate model parameters. Model fit was examined with the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), and the Bentler Comparative Fit Index (CFI). The chi-square test of model fit was also performed, but it should be noted that we expected all such tests to be significant, given the sensitivity of this test to trivial deviations from perfect fit for large sample sizes (Brown, 2006). Multiple fit indices were used to provide an assessment of different aspects of model fit to allow for a more well-rounded model evaluation. Acceptable model fit was defined as follows: RMSEA <.06, CFI > .90, SRMR <.08, (e.g. Hu & Bentler, 1999; Bentler, 1990).

To assess equivalence of measurement of the AMQ across gender (males/females) and age (6-11/12-18yrs[1]), multiple-groups CFA was performed. Measurement invariance was tested in a hierarchical manner (e.g., Vandenberg & Lance, 2000), assessing model fit with increasingly restrictive equality constraints. Specifically, we assessed (a) adequate model fit in each independent sample, (b) configural invariance (equal factor structure across groups), (c) metric invariance (equal factor loadings), and (d) scalar invariance (equal item intercepts). As limitations of the chi-square test

[1] 11-11.5 yrs and 11.6-12 yrs were rounded to 11yrs and 12yrs respectively.

in large samples are also applicable to multi-group CFA, the CFI was used as the primary indicator of measurement invariance. Data simulations by Meade, Johnson, and Braddy (2008) have demonstrated an absolute change in CFI less than 0.002 (ΔCFI < 0.002) may indicate that deviations from perfect group equivalence are functionally trivial. All analyses were performed on unstandardized parameters as is appropriate for multiple-groups CFA (Brown, 2006).

Results

Preliminary Data Screening

Preliminary analysis found no out of range values, no outliers and no obvious non-linear relationships were observed. Distributions of most variables closely approximated normality. While some negative skewness was observed in a few items, this was not considered problematic due to the large sample size employed.

CFA in testing sample

A 7-factor model consistent with the AMQ's original specification was estimated (Maras, Moon & Zhu, 2012), with factor cross-loadings set to zero, errors left uncorrelated and latent factors allowed to covary. Factor variances were estimated by fixing the loading of the first item of each factor to 1.

Estimated fit statistics were $\chi^2(356) = 4778.46$, $p < 0.001$, RMSEA = 0.070, SRMR = 0.063, CFI = 0.83, largely suggesting an inadequate fit of the specified model to the observed data. Localised areas of model strain were examined with modification indices (MIs) and standardized expected parameter change (EPC), which estimate the degree of change in model fit resulting from allowing fixed parameters to be freely estimated. Relaxation of parameter constraints was performed by freeing one

parameter then recomputing MIs and EPCs each time (Brown, 1996). Results suggested two areas of respecification:

1. Items 16, 21 and 27 substantively cross-loaded onto multiple factors (MIs = 183 - 486, EPCs = 0.36 - 0.67). This suggests these questions were composite items influenced by several latent variables rather than exclusive measures of their intended factor (e.g. 'I love going to this school' cross-loaded onto 'Identification with School', 'Self-Worth' and 'Academic Importance'). Although one option would be to include cross-loadings of these items in the model, these items were instead dropped to preserve model parsimony and to evaluate psychometric properties within a scoring framework which can be more easily administered by the researcher.

2. Recomputation after exclusion of the above items suggested correlated residuals of q2/10, q4/12, q9/11 and q25/26 (MI = 114 - 450, EPC = 0.20 - 0.32), reflecting obvious common methods effects due to wording similarity (e.g. ' I like being at school the most', ' I like being at school').

After model respecification as detailed above, recomputed fit indices were $\chi^2(274) = 2162.03$, $p < 0.001$, RMSEA = 0.052 (90% CI = 0.050 - 0.054), CFI = 0.91 and SRMR = 0.048 suggesting acceptable fit. Table 1 presents the fully standardized factor loadings, all of which were statistically significant ($p < 0.001$). In line with growing psychometric research suggesting reverse coded items may not perform well (van Sonderen, Sanderman, & Coyne, 2013), a low factor loading of 0.08 emerged for item 5. Although this endorses exclusion of item 5 from future administrations of the scale, this item was retained in the current analysis (with the exception of reliability assessment) to examine whether its loading varied across models or across subgroups. Otherwise, standardized loadings in Table 1 all exceeded 0.45 (range: 0.46 - 0.86), with the exception of item 12 (0.41). The magnitude of these loadings appears

generally consistent with the measurement of a common construct within each domain, supporting convergent validity. Table 2 reveals factor correlations to range from r=0.08 to 0.79 with a mean r=0.43. These correlations are fairly modest suggesting a degree of discriminant validity, but with the possibility of a common factor affecting item responses. The highest inter-factor correlations were between Academic Effort, Academic Competence and Academic Importance (mean r=.66, range=0.45 to 0.79), which although conceptually distinct would be expected to be closely associated.

[Tables 1 and 2 here]

Alternative models

The moderate factor correlations observed in analysis of the previous model suggested a possible common factor and prompted exploration of two further models. First a bifactor model, which specified a single general factor in addition to the seven domain-specific factors, with all factors uncorrelated (Brown, 1997). Second, a hierarchical second-order model with seven domain-specific factors loading onto a general factor. Both models assess the presence of a common factor, but while the bifactor model hypothesises that the common factor directly influences item responses (independent of domain factors), the hierarchical model hypothesises that the general factor affects item responses indirectly through its influence on the domain factors.

For the bifactor model, analysis suggested mostly poor fit of the model to the data, $\chi^2(285) = 3694.59$, $p < 0.001$, RMSEA = 0.069, CFI = 0.84 and SRMR = 0.059. For the hierarchical model, a largely acceptable fit was found, $\chi^2(288) = 2721.29$, $p < 0.001$, RMSEA = 0.058, CFI = 0.89 and SRMR = 0.057 with standardized domain-

item loadings ranging from 0.40 to 0.86 (mean 0.63), with general factor loadings ranging from 0.22 to 0.89 (mean 0.65). Although fit statistics were marginally less favourable than the first-order model (specified in 'CFA in testing sample'), the magnitude of both the common and domain factor loadings suggest the likely existence of both a common factor and domain-specific factors.

CFA in replication sample

To determine whether the final domain-specific[2] model (described in the 'CFA in testing sample' section) showed acceptable fit in an independent data sample, fit was assessed in the replication sample. Similarly favourable fit statistics emerged, $\chi^2(274) = 2280.64$, $p < 0.001$, RMSEA = 0.054 (90% CI = 0.052 - 0.056), SRMR = 0.049, CFI = 0.90, with similar factor loadings to the testing sample also observed.

Reliability & Determinacy

Scale reliabilities of each factor were estimated within the CFA model using both coefficient omega and alpha. Reliability was estimated after exclusion of the reverse coded item 5 (given its low factor loading it is suggested that this item is excluded from future administrations of the scale). Table 2 shows reliability values computed using the entire dataset (N = 5,094). Mean reliability values averaged across domains were omega = 0.69 and alpha = 0.72, which suggests general acceptable reliability compared against conventional guidelines of 0.7 for alpha, e.g., Kline, 2000. However, Table 2 also suggests suboptimal reliability for some individual domains, with omega values below 0.60 for Identification with School (0.58) and General Self-Worth (0.59).

[2] This model was assessed as this had the most favourable fit statistics

Determinacy was also evaluated for all factors. A highly indeterminate factor is one that can produce markedly different sets of factor scores from the same factor loadings depending on the method of computation (Grice, 2001). It is therefore important to evaluate factor determinacy to inform research outside of the SEM framework that intends to compute factor (e.g. to assess rank order or for use in further analysis). Table 2 shows determinacy values to range from 0.82 - 0.94 meeting suggested thresholds (e.g. > 0.80, Gorsuch, 1983).

Measurement invariance across gender and age

After first establishing adequate absolute fit in independent male and female subsamples and in independent age groups, configural, metric and scalar invariance were assessed in sequence across gender and then across age. As expected, chi-square tests for all invariance models were significant, suggesting population parameters were unlikely to be precisely equal across gender or age groups. CFI and RMSEA fit indices for measurement invariance testing are summarised in Table 3, with ΔCFI < 0.002 used in each invariance test as the threshold to indicate meaningful differences across groups (Meade, Johnson, and Braddy, 2008).

[Table 3 here]

For gender, absolute values of CFI and RMSEA in Table 3 indicate acceptable absolute model fit for configural, metric and scalar invariance tests, with all ΔCFIs< 0.002, suggesting little appreciable degradation in model fit with each increasingly restrictive constraint. These results suggest that the basic factor structure of the AMQ,

the factor loadings and the item intercepts are unlikely to be substantively different across gender (similarity of factor loadings[3] across groups can be easily corroborated by an inspection of unstandardized loadings in Table 1), and therefore that males and females respond to items in the same way. Given all invariance tests were satisfied, a further equality constraint was imposed on item error variances, and indicated acceptable fit, RMSEA = 0.051, CFI = 0.902, with ΔCFI = 0.001 suggesting the degree of item error was also equivalent across gender.

For age, results indicate partial variance of the AMQ across the two age groups. Results in Table 3 support configural invariance across age, with metric invariance largely satisfied (although the absolute CFI fit statistic was marginally below the acceptable threshold), suggesting the basic factor structure and factor loadings of the AMQ are likely to be similar across age groups of 6-11 yrs and 12-18 yrs. However, for scalar invariance testing, ΔCFI=.003 was observed, suggesting that item intercepts may be different across age groups.

Finally, coefficient omega indicated adequate overall reliability of the AMQ for both male (ω=.68) and female (ω=.70) subsamples and for Primary (ω=.66) and Secondary (ω=.68) age groups.

Discussion

The purpose of the current study was to determine whether the AMQ is a psychometrically sound instrument to measure a child or adolescent's social identity and self-concept. Results from analysis were are largely supportive of the original proposed seven-factor structure of the AMQ (Maras, 2002; Maras et al., 2007),

[3] Given that the standard deviations of most items are close to 1, any differences in loadings can be roughly approximated to differences in standardized scores.

indicated general adequate reliability and suggest that the AMQ is a sound instrument whose psychometric properties are optimised with the omission of specific items.

Prior to the current study, the factorial structure of the AMQ had not been extensively assessed. These findings therefore build upon previous research that has reported the use of AMQ within adolescent research (Maras, Brosnan, Faulkner, Montgomery & Vital, 2006; Maras, 2007; Maras et al., 2007; Maras, Moon & Zhu, 2012) and provide support for the original framework of the AMQ suggested by the developer (Maras, 2002) thereby validating previous research that has reported use of this tool within childhood research. Furthermore, in addition to the existence of individual domain factors, there was some evidence to suggest an additional common factor influence on domain factors, possibly reflecting Academic Social Identity.

Metric and scalar invariance across gender was demonstrated for the AMQ supporting measurement equivalence and that male and female factor scores can be legitimately compared (Brown, 1997). Indeed, several studies have already made comparisons across gender on the AMQ (Maras, Moon & Zhu, 2012; Maras, Carmichael, Patel & Wills, 2007; Maras, 2007; Bornholt, Maras & Robinson, 2009; Maras, Brosnan, Faulkner, Montgomery & Vital, 2006), and the current results suggest such comparisons are valid.

However, the current analyses suggested that while the AMQ demonstrated metric invariance (equal factor loadings) across two age groups (6-11 yrs and 12-18 yrs), scalar invariance (equal intercepts) was not supported. While metric invariance suggests that the strength of the relationship between the items and the underlying AMQ domains is the same across primary and secondary level age groups, the lack of scalar invariance indicates that different age groups may interpret some items differently. This could potentially result in a difference in mean factor scores across

groups even when true values of the underlying construct are the same (Brown, 2006), and therefore any comparisons of AMQ domain scores across these age groups should be undertaken with extreme caution in future studies. Furthermore, while adequate reliability was generally demonstrated for most AMQ domains, reliability for Identification with School (omega=.58) and General Self-Worth (omega=.59) was low (Table 2). The fact that notably lower omega values were observed relative to alpha values for these factors suggests that this may be partly a result of similarity of item wording within these domains.

The current study has a number of strengths. Firstly, this is the first formal assessment of the AMQ's reliability and subsequent psychometric properties. Consequently, the current findings significantly contribute to our understanding of how the items load together and provide evidence for the validity of the tool. Based on these findings, the AMQ has the potential to become a reasonable alternative to other measures already standardised and validated, particularly as a method of measuring social identity in younger samples.

Secondly, CFA provides a more in-depth assessment of the AMQ as a psychometrically sound measure of children's social identity and self-concept. CFA provides a more informative measure of reliability (Raykov, 2001), a more rigorous examination of factorial structure and evidence of previously unexamined measurement invariance across gender.

The current study has a number of limitations. Firstly, the findings are based on cross-sectional data. The limitations associated with this design method suggest that future assessment of the AMQ's stability over time is required using longitudinal design and further validation between age groups. Thus, future research should assess

the reliability and psychometric properties of the AMQ with across salient developmental periods such as the transition to primary and secondary schools.

Secondly, the current study does not include an assessment of the AMQ's concurrent, predictive or convergent validity via assessment with other tools that have been standardised and validated on similar populations. Although this was not the objective of the current study, future research should address this limitation. As a consequence the current study should be regarded as the first of many assessments reporting the AMQ's psychometric properties.

The findings have a number of implications for researchers currently using the AMQ and for professionals working with students within academic contexts. Firstly, the modifications to the AMQ suggested by these findings indicate that current users are still able to administer the 29-item version of the AMQ. It is however advisable that the suggested modifications are then to be made at the analysis stage to optimise measurement.

Secondly, as the findings indicate that the AMQ is designed for assessing social identity with children across a broad spectrum of ages within academic contexts, researchers are able to investigate when and where and how changes in social identity are occurring developmentally using the one measure. Furthermore, when combining the AMQ tool with other measures, such as the Strengths and Difficulties Questionnaire (Goodman, 1997) or the Youth Materialism Scale (Goldberg, Gorn, Peracchio & Bamossy, 2003), as previous projects have, it is possible to identify the bio-psycho-social risk factors in adolescents and how these factors change and interrelate as children develop.

Finally, the results have implications for professionals working with children within schools. With further assessment of the AMQ's reliability and validity over

time, different age groups and comparisons with standardised tools, the AMQ could become a valuable measure to assess children within school contexts. Indeed, findings generated using the AMQ have already been used to inform public policy, Special Educational Needs (SEN), and to address antisocial behaviour in schools (i.e. see Parsons, Maras, Knowles, Bradshaw, Hollingworth & Monteiro, 2008; and UK House of Commons Education Select Committee inquiry, 2011).

Future research should strive to overcome the limitations of the current study by establishing the AMQ's stability over time, in addition to seeking validity of the AMQ against other standardised tools such as the SDQ and other social identity measures. Such research would strengthen the AMQ's viability in an already competitive field. Furthermore, it is acknowledged that an individual's social identity is not a stable property, particularly in relation to academia and family institutions, thus it would be of interest to current and future users of the AMQ to understand how scores may fluctuate over time by assessing children of different age cohorts and from different clinical populations. Subsequent findings would permit the development of normed values, allowing the AMQ to be developed for use as a screening tool to identify children most at risk of poor social identity and poor academic outcomes. In addition, the widespread use of the AMQ across international borders suggests that further assessment of the tools viability as a cross-cultural measure is warranted. Finally, and importantly, further research would be beneficial to identify reasons for suboptimal reliability of the 'Identification with School' and 'General Self-Worth' domains, as well as reasons for lack of scalar invariance across age, and identify appropriate remedial solutions.

Conclusions

The key benefit of the AMQ is that, with the use of the primary school pictorial supplement, it can be administered to both males and females, and used across age groups to study associations with other constructs of interest, although caution must be applied when making direct comparisons of factor means across age groups. It should allow researchers to investigate and map developmental changes in social identity longitudinally, effectively identifying the when, where and how in one measure. It is recommended that the single reverse coded item (q5) and the composite items 16, 21, 27 are omitted from future applications of the AMQ in order to maximise its measurement properties for the assessment of self-concept and social identity in applied social settings

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Table 1. *Descriptive statistics and fully standardized (β) factor loadings in testing sample (n=2541), with unstandardized (B) loadings across gender and age based on entire sample (N=5082).*

	Overall			Gender		Age	
Item	M	SD	β	B (Girls)	B (Boys)	B (5-11 yrs)	B (12-18 yrs)
F1 - Identification with Peers							
1. I like being with my friends	3.80	0.91	0.62	1.00	1.00	1.00	1.00
2. I like doing the same as my friends	3.30	0.93	0.57	0.89	0.91	0.88	0.94
3. I like hanging out with my friends	4.30	0.69	0.58	0.68	0.71	0.72	0.72
4. I am similar to my friends	3.30	1.02	0.50	0.81	0.87	0.80	0.92
F2 - Identification with Family							
5. I like being alone at home	2.70	1.08	0.08	0.16	0.12	0.05	0.15
6. I like doing the same as my family	3.10	1.03	0.63	1.00	1.00	1.00	1.00
7. I like being with my family	4.10	0.93	0.76	1.10	1.12	0.98	1.11
8. I am similar to my family	3.30	1.13	0.65	1.18	1.05	1.31	1.12
F3 - Identification with School							
9. I like being at school the most	2.10	1.05	0.56	1.00	1.00	1.00	1.00
10. I like doing same as students	2.70	0.95	0.50	0.39	0.56	0.57	1.05
11. I like being at school	2.80	1.18	0.66	1.30	1.34	0.91	1.42
12. I am similar to students at my school	2.40	0.96	0.41	0.33	0.34	0.38	0.87
F4 - Academic Effort							
13. I work hard at school	3.70	0.95	0.86	1.00	1.00	1.00	1.00
14. I put in lot of effort at school	3.80	0.93	0.85	0.95	0.95	0.87	0.97
15. I finish schoolwork	3.30	0.95	0.63	0.70	0.70	0.64	0.72
F5 - Academic Competence							
17. My schoolwork is good	3.60	0.88	0.75	1.00	1.00	1.00	1.00
18. Friends think my schoolwork is	3.40	0.93	0.65	0.93	0.96	0.96	0.93
19. Family think my schoolwork is	3.90	0.92	0.71	1.00	0.97	0.91	1.00
20. Teachers think my schoolwork is	3.60	0.90	0.76	1.03	0.99	1.07	1.01
F6 - Academic Importance							
22. My friends think it's great I go	3.40	1.02	0.64	1.00	1.00	1.00	1.00
23. My family think it's great I go	3.70	1.09	0.69	1.11	1.06	0.83	1.15
24. My teachers think it's great I go	3.50	0.92	0.67	1.01	0.90	0.88	0.90
F7 - General Self-Worth							
25. I am happy being the person I am	4.00	1.06	0.53	1.00	1.00	1.00	1.00
26. I like the way I look	3.50	1.18	0.46	0.99	0.90	0.90	0.90
28. My friends like me	4.10	0.82	0.64	0.79	1.05	0.99	0.90
29. My family like me	4.40	0.87	0.72	1.01	1.22	0.78	1.06

Table 2. *Intercorrelations, reliability (alpha and omega) and determinacy of factors (final model)*

	F1	F2	F3	F4	F5	F6	F7
F1	1.00						
F2	0.15	1.00					
F3	0.20	0.45	1.00				
F4	0.08	0.46	0.52	1.00			
F5	0.19	0.46	0.51	0.79	1.00		
F6	0.18	0.46	0.60	0.54	0.65	1.00	
F7	0.33	0.65	0.31	0.45	0.58	0.63	1.00
Alpha	0.65	0.72	0.67	0.81	0.80	0.69	0.72
Omega	0.64	0.71	0.58	0.82	0.80	0.69	0.59
Determinacy	0.82	0.88	0.82	0.94	0.93	0.88	0.87

Table 3. Measurement invariance tests across gender (male/female) and age (5-11 yrs/ 12-18 yrs) showing absolute and change (Δ) values for CFI and RMSEA.

	Invariance Test*	CFI	RMSEA	Δ CFI
Gender	Configural	0.905	0.054	-
	Metric	0.904	0.053	0.001
	Scalar	0.903	0.052	0.001
Age	Configural	0.900	0.054	-
	Metric	0.898	0.053	0.002
	Scalar	0.895	0.053	0.003

* Configural=equivalent factor structure, Metric=equal factor loadings, Scalar=equal intercepts