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## Validation of the Adolescent Social Identity Measure: Adolescents' Perception of Themselves in a Social Context

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**Abstract:** Social identity is an important social determinant of student outcomes such as mental health and well-being. Currently, no validated social identity measures exist for adolescents in secondary school settings. A new 'Adolescent Social Identity' measure was developed by adapting two social identity dimensions from a validated reputation enhancement scale. The Social Identity Measure comprises two scales of 10 items each to measure how adolescents think their peers view them (e.g., reputational status) in terms of their conforming and nonconforming behaviour (Self-perception of Public Self) and how adolescents would ideally like to be viewed (Ideal Public Self) by peers. Exploratory and confirmatory factor analyses were conducted along with assessments of reliability, validity, and measurement invariance. Conforming and Nonconforming subscales for both scales were shown to be reliable, valid, and invariant across age and gender groupings. There were significant but small differences in the latent means for gender.

**Keywords:** *Adolescents, confirmatory factor analysis, social identity, validation.*

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### Introduction

The process of establishing a sense of identity and grappling with the fundamental question of "Who am I?" is a critical stage of development during adolescence. Failing to achieve this developmental milestone can negatively impact student outcomes and educational choices (Holmegaard et al., 2014) with psychological issues arising in later life (Campbell et al., 2019; Hatano et al., 2020; McGraw et al., 2008). Social identity is an important social determinant of student outcomes such as mental health and well-being (Albarello et al., 2021; Cruwys et al., 2014; Jetten et al., 2017), with mental health problems among adolescents steadily increasing over the past decade (Bassilios et al., 2016; Lawrence et al., 2016).

Building strong social identities in adolescence may positively impact student mental health and well-being. This has never been more important in recent years with the COVID-19 pandemic causing interruptions to schooling and social connectedness that has resulted in increases in mental health issues and isolation among youths (Courtney et al., 2020; Zieher et al., 2021). Having up-to-date understanding of adolescents' social identity through valid measures is vital to provide timely support and improve mental health.

Various maladaptive behaviours such as delinquency (Schwartz et al., 2005), rebelliousness (Gandhi et al., 2017), intimidation and physical aggression (Bruner et al., 2018) may be heightened during adolescence and linked to identity development. According to Erikson (1968), the primary task of adolescence is to successfully navigate the psychosocial crisis of developing a coherent identity versus experiencing role confusion. Achieving identity coherence is important as previous studies have demonstrated its bidirectional relationship with adolescent adjustment (Ferrer-Wreder et al., 2008). Successful resolution of the identity crisis during adolescence has been associated with identity coherence whereby adolescents develop a strong sense of who they are, their goals, ideals, and values (Gandhi et al., 2017).

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Successful identity formation is reflected by a crystallised set of identity commitments which adequately reflects “who one is” and thus, provides direction in life (Erikson, 1968; Soenens et al., 2011). During adolescence, the peer group significantly influences the development of identity, and specifically the social identity of adolescents (Albarello et al., 2018; Campbell et al., 2019; Carroll et al., 2003). In their three-wave longitudinal study of 304 adolescents, Albarello et al. (2018) found that personal identity and social identity processes of adolescents become more intertwined over time, because of sharing similar social contexts and because these social contexts influence the forming of personal identity. Social identity, therefore, is in essence the summation of public (social) perception that one has of self and the public (social) perception that one believes others have of them.

Emler’s reputation enhancement theory (1984) implicates individuals as being responsible for choosing their social identity. Individuals engage in reputation enhancement by choosing the audience they want to witness their activities and anticipating that by sharing this knowledge they will attain an ideal social identity (Emler, 1984). In particular, young people like to show who they are through deliberate and observable behaviours that convince others of their membership in a particular social group (Emler, 1990). As such, reputation plays a vital role in connecting individuals to their desired social identity. These social identities help individuals establish their status among peers and have their needs recognised (Hopkins & Emler, 1990).

Early work by Carroll et al. (1999) established the reputation enhancement scale, which aimed to discern the varying perspectives on reputations among adolescents in different circumstances, including those who are incarcerated delinquent, at-risk, and nondelinquent adolescents. Based on the work of Gold et al. (1989) and Emler (1990), interviews were conducted with delinquent and nondelinquent adolescents to develop the 148-item scale. The original reputation enhancement scale comprised seven dimensions, including friendliness, admiration, self-perception of public self (social identity), ideal public self (social identity), self-description of private self (self-identity), ideal private self (self-identity), and communication of events (see Carroll et al., 1999). The reputation enhancement scale was able to reliably gauge individual differences in peer reputation as well as differentiate among various adolescent reputations, in relation to their levels of risk for delinquency. Carroll et al.’s work highlights that different adolescents are concerned about sustaining different types of reputations and will display behaviours that are consistent with their desired reputation to enhance their social identities in front of their desired audiences.

### *The Present Study*

One shortcoming of the reputation enhancement scale in its present form, is its utility with a mainstream school population. Several of the original items make mention of delinquent activities (e.g., get in trouble with police, do things against the law) which are not conducive for regular use in mainstream school settings. Moreover, educators were very interested in the social identity and self-identity items of the reputation enhancement scale for use with their adolescent students. Understanding students’ perception of their public self and the perception that they believe others have of them, provides educators with valuable information to benefit their students’ social formation and potentially positively impact learner outcomes (both cognitive and non-cognitive). This has become even more poignant given the rise of social media since the original scale was developed (Bourgeois et al., 2014).

To date, few studies have been conducted to develop a reliable and valid measure of the social identity of adolescents in a school setting. One such measure is the Social and Personal Identities (SIPI) scale developed by Nario-Redmond et al. (2004). The SIPI scale discerns between the interpersonal aspect of the self, which highlights an individual’s distinctiveness from others, and the social identity aspect of the self, which pertains to the identification of an individual based on their group affiliations. While the constructs are similarly named to the Adolescent Social Identity measure developed in the present research, they measure different constructs, and the focus is on an adult population drawn from community samples and undergraduate students.

To develop a social identity measure of adolescents for use in school settings, the two social identity dimensions from the reputation enhancement scale were adapted for use in mainstream school settings. Based on our previous work, the aim of the present study was to: (a) adapt the social identity dimensions of Carroll et al.’s (1999) reputation enhancement scale to create the Adolescent Social Identity measure and (b) determine whether this is a reliable and valid measure of individual’s social identity within the general adolescent school population. Existing data collected from an adolescent student population underwent exploratory and confirmatory factor analyses to validate the scales in this measure.

## **Methodology**

### *Participants*

Participants attended three metropolitan public high schools in the capital city of Queensland, Australia. Queensland is broadly representative of other Australian states. The city is in a high-growth area with roughly 323 thousand residents (Australian Bureau of Statistics, 2018), representing various socio-economic backgrounds. The midpoint weekly income is \$1,523, slightly below the weekly midpoint income for the state (\$1,734). Students aged 12–17 years enrolled in these schools, were randomly selected to participate. A total of 1,508 students participated, including 735 males (48.7%) and

773 females (51.3%) (468 from school 1; 497 from school 2; 543 from school 3). Among the participants, 758 (50.3%) were Junior students (12–13 years) and 750 (49.7%) were Senior students.

The student enrolments in the schools ranged from 770–1,700 students, with the Index of Community Socio-Educational Advantage (ICSEA) ranging from 911–945. The ICSEA values of schools are determined by a combination of factors, including the socio-educational status of students (in terms of parent occupation and education), the remoteness of the school's location, and the proportion of Indigenous students and those from a Language Background Other than English (LBOTE) (Barnes, 2010). The scores assigned to Australian schools, which reflect their level of disadvantage, span from 500 (extremely disadvantaged) to 1,300 (advantaged). The median score is set at 1,000 with a standard deviation of 100, as reported by Barnes (2010). Among participating schools, the percentage of Indigenous students ranges from 7% to 9%, while the percentage of students with a LBOTE varies from 3% to 28%.

### Measure

The Adolescent Social Identity measure is comprised of two scales, namely *Self-perception of Public Self* and *Ideal Public Self*. These scales were drawn from two dimensions in the reputation enhancement scale and adapted for use in a mainstream school setting. Each scale comprised 16 items, designed to examine how youths perceived reputation enhancement in different ways, depending on their engagement with delinquent activities, and were refined through consultation with peers, incarcerated youths, high school teachers, and students. The scales aimed to measure how participants view themselves and how they ideally want their peers to view them concerning their behaviour, social identity, and reputational status.

Items in the *Self-perception of Public Self* scale measured how adolescents think their peers view them in terms of their conforming and nonconforming behaviour and their reputational status (e.g., “My friends think that I am popular”). The *Ideal Public Self* scale items assessed participants' aspirations for how they want others to perceive them e.g., “I would really like my friends to think that I am popular”). Participants who scored high on nonconforming items would express a preference for being perceived as having delinquent traits in contrast to those who scored low on nonconforming items.

For the present research, the 16 original items were modified and adapted for mainstream school settings. Three items were modified. For example, “My friends think that I do things against the law” became “My friends think that I do things against the school rules”. Based on further discussions with five classroom teachers and their students, a further three items were added, namely “I work well as part of a team”, “I am annoying to other people in my class”, and “I am likely to do well at school”. For the present study and in line with the original scale, a four-point response format (Never, Sometimes, Often, Always) was used. To measure two distinct constructs, the headings for each of the two sets of items differed: For *Self-perception of Public Self*, the heading was “My friends think that...”; for *Ideal Public Self*, the heading was “I would really like my friends to think that...”. Both constructs were designed to comprise two sub-constructs: *Conforming* and *Nonconforming*. Table 1 shows the item wording and the sub-construct to which each item is hypothesised to belong.

Table 1. Items and Hypothesized Factors of the Measure

Item	Factor	Sub-construct
1	I am popular	Conforming
2	I get into trouble at school	Nonconforming
3	I am a good person	Conforming
4	I get along well with other people	Conforming
5	I work well as part of a team	Conforming
6	I am annoying to other people in my class	Nonconforming
7	I do things against the school rules	Nonconforming
8	I am a leader	Conforming
9	I have a “bad” reputation	Nonconforming
10	I am tough	Conforming
11	I can be trusted with secrets	Conforming
12	I am a bully	Nonconforming
13	I am a bad kid	Nonconforming
14	I have a “good” reputation	Conforming
15	I am likely to do well at school	Conforming
16	I am a loner	Nonconforming

Table 2 shows descriptive statistics for both sets of Social Identity items. Many items were skewed to such an extent that the modes of the distributions were located at one end or the other of the response scales. For this reason, we treated the items as ordered categorical items and employed procedures that are appropriate for ordered categorical items (procedures outlined shortly).

From Table 1, the seven items hypothesized to belong to the *Nonconforming* sub-construct were worded in the opposite direction to the *Conforming* items; thus, if participants obtained a high score on a *Nonconforming* item, it indicates a preference to be perceived as having more delinquent traits. For the purposes of the analyses and as shown in Table 2, the *Nonconforming* items had their scores reversed, resulting in all items being skewed in the same direction (or the skews were negligibly small). After reversing, if a participant obtains high scores on both the *Conforming* and *Nonconforming* items, it suggests a desire to be perceived as less delinquent and more conforming in character.

Table 2. Descriptive Statistics for Ideal Public Self and Self-Perception Items of the Social Identity Scales (N=1,508)

Item	Self-Perception				Ideal Public Self			
	Mean	SD	Skew	Kurtosis	Mean	SD	Skew	Kurtosis
<b>Nonconforming</b>								
02_Trouble	3.06	0.86	-0.79	0.13	3.32	0.87	-1.23	0.76
06_Annoying	2.98	0.91	-0.72	-0.19	3.26	0.96	-1.14	0.22
07_Disobey	3.18	0.88	-0.95	0.21	3.35	0.91	-1.32	0.76
09_Bad reputation	3.44	0.80	-1.5	1.74	3.6	0.77	-2.05	3.55
12_Bully	3.57	0.74	-1.92	3.40	3.67	0.72	-2.44	5.48
13_Bad	3.48	0.79	-1.57	1.98	3.6	0.76	-2.05	3.61
16_Loner	3.39	0.90	-1.44	1.15	3.47	0.91	-1.66	1.6
<b>Conforming</b>								
01_Popular	2.47	0.89	0.11	-0.74	2.75	0.96	-0.23	-0.93
03_Good	3.13	0.83	-0.61	-0.4	3.38	0.84	-1.15	0.37
04_Get along	3.04	0.83	-0.41	-0.64	3.28	0.84	-0.9	-0.14
05_Team	2.96	0.88	-0.37	-0.78	3.22	0.9	-0.85	-0.33
08_Leader	2.36	0.97	0.25	-0.9	2.72	1.02	-0.17	-1.15
10_Tough	2.34	0.9	0.31	-0.66	2.59	1	0	-1.1
11_Secrets	3.27	0.91	-0.94	-0.25	3.48	0.87	-1.51	1.09
14_Good reputation	2.94	0.90	-0.40	-0.73	3.20	0.93	-0.85	-0.38
15_Do well at school	2.99	0.86	-0.44	-0.59	3.26	0.88	-0.95	-0.06

Nonconforming scores have been reversed

In confirmatory factor analyses (CFAs), correlations between item residuals are by default fixed to zero but can be freely estimated if it can be argued that certain pairs of items have common content or have common wording. On inspection of the item wording (Table 1), item pairs have similar wording or content. For instance, it is argued that Items 9 and 14 have common content because they have opposite wording (both refer to “reputation”, one “good”, the other “bad”). Also, it is argued that “bully” and “bad” (Items 12 and 13) have common content, possibly more so because one follows the other in the survey instrument. Similarly, it is argued that two items referring to “school” (Items 2 and 7) have common content: one to do with “school rules”, one to do with “getting into trouble”. The first E/CFA allowed the correlations between residuals for these pairs of items to be freely estimated, but there were other pairs of items that contained the same words or similar wording (“good person” and “good reputation”; “work well” and “get along well”), and thus there could potentially be many correlations.

### Procedure

An Australian University Human Research Ethics Committee (Ethical Clearance Number: 2011000940) approved the study in line with their ethical review guidelines and processes. Prior to commencement of the research, participants were provided with information regarding the purpose of the study, emphasised that participation was voluntary, and that they had the freedom to withdraw at any time. Additionally, the process of de-identification and data storage was explained before commencement. The Adolescent Social Identity measure was administered as part of a battery of scales in each of the three schools during class time and completion took approximately 15 minutes.

### Data Analyses

To assess the factorial validity of the social identity measure, the sample was randomly divided into three sub-samples for analysis. This decision was based on the advice of Raykov and Marcoulides (2011) who caution that running EFA and CFA on the same dataset may result in untrustworthy p-values. As a result, the sample from each school was divided into three subsamples of roughly equal size. Table 3 shows the gender and age characteristics of the sample and sub-samples. Approximately half the students were female, approximately half were Junior students (12–13 years), and the mean age was 13.9 years. A one-way ANOVA was used to compare the mean age across the three sub-samples and a chi-square test compared the gender distribution across the three sub-samples. There were no statistically significant differences between the sub-samples for Age ( $F(2,1505)=1.75, p=.174$ ) and Gender ( $\chi^2(2, N=1,508)=3.36, p=.19$ ).

Table 3. Gender and Age Characteristics of the Sample and Sub-samples

	Sample	Sub-samples		
		1	2	3
<b>Gender</b>				
Female	773 (51.3%)	252 (50.1%)	279 (55.5%)	242 (48.2%)
Male	735 (48.7%)	251 (49.9%)	224 (44.5%)	260 (51.8%)
<b>Age</b>				
Mean	13.9	13.9	14	13.9
SD	1.69	1.67	1.68	1.71
Junior	758 (50.3%)	257 (51.1%)	240 (47.7%)	261 (52.0%)
Senior	750 (49.7%)	246 (48.9%)	263 (52.3%)	241 (48.0%)
<b>TOTAL</b>	<b>1,508</b>	<b>503</b>	<b>503</b>	<b>502</b>

The first sub-sample (n=503) was used to conduct Parallel Analyses and Scree Tests to indicate the number of factors underlying each set of items, and conduct preliminary exploratory factor analyses (EFAs). The purpose of the EFAs was to determine number of factors and remove poorly performing items (small loadings on all factors, substantial loadings on more than one factor, small amounts of variance accounted for, implicated in residual correlations greater than 0.1) and poor factors (factors with only one or two items loading) from further consideration. An oblique Quartimin rotation was requested to facilitate interpretation of the factors.

For the second sub-sample (n=503), EFAs were conducted within a confirmatory framework (E/CFAs) following the approach outlined by Brown (2015). The revised models resulting from the EFAs were subsequently subjected to E/CFAs. The E/CFA has the same number of identifying restrictions as used in EFA. From the EFA, anchor items, large loading items on one factor but small loadings on other factors, were selected for each factor. The cross-loadings of anchor items were fixed to zero but loadings of all other, non-anchor items were freely estimated. Furthermore, the variances of the factors were set to a fixed value of one, while the covariances between the factors were estimated without constraints, following the methodology described by Brown (2015). The analysis is exploratory in the sense that all non-anchor items load on all factors but is confirmatory in that results indicate the significance of loadings and any potential cross-loadings, and modification indices allow identification of potential substantial indicator error or residual covariances. The third sub-sample (n=502) was used to conduct confirmatory factor analyses (CFAs) using the revised models from the E/CFAs, to obtain reliability and validity measures, and to conduct measurement invariance analyses across gender and age groupings.

The *semTools* package (Pornprasertmanit et al., 2018), and the *Lavaan* package (Rosseel, 2018), which are both tools within the R statistical environment (R Core Team, 2018) were utilised to conduct both exploratory and confirmatory factor analyses. Preliminary data exploration showed that distributions for most items were skewed. As suggested by Brown (2015) and Finney and DiStefano (2013), the recommended approach for analysing skewed ordered categorical data is to use robust weighted least squares mean and variance adjusted (WLSMV) estimator. The WLSMV estimator employs polychoric correlations when dealing with ordered categorical data. Notably, both the *lavaan* and the *semTools* packages provide the WLSMV estimator, making it accessible for both EFAs and CFAs.

Various indices were employed to assess the goodness of fit of both exploratory and confirmatory models. These indices, along with their respective threshold values indicating acceptable and favourable model fit as suggested by Little (2013) included:

- Scaled  $\chi^2$  statistics and their degrees of freedom (however, if the  $\chi^2$  statistic is significant but other indices indicate acceptable fit and there are no obvious indications of mis-fit according to the Modification Indices and the matrix of residual correlations, then the significant  $\chi^2$  will be overlooked).
- For the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI), values above 0.95 indicate a strong fit, while values above 0.90 indicate an acceptable fit; CFI and TLI are scaled indices based on  $\chi^2$  statistic, which are commonly used to evaluate model fit.
- The Root Mean Square Error of Approximation (RMSEA) is considered acceptable if it is below 0.08 and indicative of a close fit if it is below 0.05. RMSEA, like CFI and TLI, is based on the  $\chi^2$  statistic and commonly used to assess model fit.
- Standardised Root Mean Square Residual (SRMR) is considered acceptable if it is below 0.08 and indicative of a good fit if it is below 0.05.

The reliability and validity of the resultant scales were assessed, and measurement invariance was examined. Reliability was assessed using the  $\omega$ -3 coefficient, recommended by Kelley and Pornprasertmanit (2016) for ordinal categorical variables. Confidence intervals (CIs) for the  $\omega$ -3 coefficients were bias-corrected and accelerated (BCA) bootstrap CIs based on 2000 bootstrap samples. Convergent validity was assessed using Average Variance Extracted (AVE), as

described by Fornell and Larcker (1981). AVE values greater than 0.5 are indicative of a construct's convergent validity. Evidence for discriminant validity is established when the AVEs for two factors are both greater than the squared correlation between the two factors (Fornell & Larcker, 1981). As well, factor determinacy (the correlation between factor score estimates and factors), and the H index (a measure of construct reliability or construct replicability, and appropriate for assessing how well a group of items define a latent variable in a measurement model) were calculated. When factor determinacy is larger than 0.9, one can be confident in the factor score estimates; when factor replicability is larger than 0.7, one can be confident that latent variables are reliably identified (Rodriguez et al., 2016).

Measurement invariance was tested across gender and age, by estimating increasingly constrained models, then evaluating if differences between models were significant using the Satorra-Bentler scaled difference in  $\chi^2$  test (Satorra & Bentler, 2010); thus establishing in sequence, configural, metric, scalar, and strict invariance (Millsap, 2012). A series of constraints for the purposes of identification were applied to the configural model (Millsap, 2012). The constraints, appropriate for ordered categorical variables, were:

- For each factor, the factor loadings of one marker variable were fixed to 1 (other factor loadings were freely estimated).
- One threshold for each variable was constrained to equality across the groups;
- One additional threshold of the marker variable was constrained to equality across groups (other thresholds were freely estimated).
- For a reference group, the residual variances were constrained to 1 (residual variances in the other groups were freely estimated) and factor means were constrained to zero (factor means in other groups were freely estimated).

Configural invariance requires the pattern of zero and non-zero loadings be the same across the groups. Metric invariance requires the loadings for all variables to be constrained to equality across the groups. Scalar invariance requires the thresholds not already constrained for the purpose of identification to be constrained to equality across groups. Strict invariance requires the residuals and any residual covariances to be constrained to equality across groups. Theta parameterization was used for all measurement invariance models. Finally, differences in latent means were assessed by constraining means to equality across groupings.

## Results

### *Exploratory Factor Analyses (EFAs)*

The EFAs were run using the first sub-sample. For both sets of items, preliminary analyses showed that there were indeed factors underlying the items (KMOs were greater than 0.8: 0.85 for both *Self-Perception of Public Self* and the *Ideal Public Self* items). Parallel analysis and scree tests revealed that, in each case, the first two factors had eigenvalues greater than one, but the scree plots (of eigenvalues against the number of factors) showed an elbow at three or possibly four factors, while parallel analysis suggested that two factors be retained. Therefore, for both sets of items, the two- and three-factor solutions were requested. However, the three-factor solution was rejected because the third factor had only one item with a substantial loading (greater than 0.4). The patterns of loadings for the two-factor solutions on both sets of items were nearly the same as each other, and both were nearly the same as the hypothesized factors (see Table 1). Differences lay with Item 16. For *Self-Perception of Public Self*: Item 16 did not load on either factor (loadings less than 0.4); only 0.15 of its variance was accounted for; and six of eleven residual correlations greater than 0.1 involved Item 16. For *Ideal Public Self*: Item 16 loaded on the *Nonconforming* factor but it was the poorest performing item with only 0.27 of its variance accounted for; and four of nine residual correlations greater than 0.1 involved Item 16. For these reasons, Item 16 was dropped from the analyses.

However, there were other items that appeared to be responsible for misfit in various ways. In a sequence of EFAs, five additional items were dropped from the analyses:

- Item 1 had a large cross-loading and a small proportion of variance accounted for.
- Item 8 had small proportions of variance accounted for.
- Item 10 had large cross-loadings.
- Item 11 had small proportions of variance accounted for.
- Item 15 involved in residual correlations greater than 0.1.

These items were dropped for statistical reasons but dropping them can also be justified for reasons of validity. Four items (1, 8, 10, and 11) were hypothesized to belong to the *Conforming* factor, but it is not clear to which sub-construct each belongs. One could be a leader, popular, tough, and trusted with secrets for both delinquent (i.e., nonconforming) and conforming reasons. Also, it could be argued that Item 15 is qualitatively different from other items. Other items are more to do with quality of character whereas this item was asking students about something other than character, about an event in the future.

Table 4 shows standardized loadings,  $R^2$  values, factor correlations, and goodness-of-fit indices for the revised models. For both sets of items, the Table shows two distinct though correlated factors. All primary loadings were larger than 0.60, and items loaded onto a *Conforming* and *Nonconforming* factor as hypothesized. Approximate fit indices indicated a good fit although the upper end of the 90% CI for RMSEA exceeds 0.08 (but only by a small amount). There were no residual correlations greater than 0.10, but the  $\chi^2$  was statistically significant. The significant  $\chi^2$  (and  $\chi^2$  was large compared to df) suggested that the models could be mis-specified. In the next section, the models are explored via E/CFA, which allows for modifications.

Table 4. Two-factor Structure of Self-Perception and Ideal Public Self Items of the Social Identity Scales from Exploratory Factor Analysis (Quartimin Rotation)

Item	Self-Perception			Ideal Public Self		
	F1	F2	R <sup>2</sup>	F1	F2	R <sup>2</sup>
02_Trouble	<b>0.848</b>	-0.069	0.691	<b>0.784</b>	-0.027	0.598
06_Annoying	<b>0.604</b>	-0.081	0.343	<b>0.765</b>	-0.056	0.554
07_Disobey	<b>0.828</b>	-0.071	0.658	<b>0.843</b>	-0.071	0.666
09_Bad reputation	<b>0.762</b>	0.185	0.695	<b>0.82</b>	0.089	0.74
12_Bully	<b>0.751</b>	0.001	0.565	<b>0.868</b>	0.026	0.772
13_Bad	<b>0.851</b>	0.051	0.751	<b>0.889</b>	0.039	0.82
03_Good	0.114	<b>0.733</b>	0.598	0.107	<b>0.85</b>	0.808
04_Get along	-0.034	<b>0.808</b>	0.638	-0.062	<b>0.853</b>	0.688
05_Team	-0.152	<b>0.764</b>	0.541	-0.089	<b>0.881</b>	0.721
14_Good reputation	0.249	<b>0.617</b>	0.53	0.224	<b>0.619</b>	0.545
Factor correlation	0.284	0.407				
$\chi^2$ (df)	85.04 (26)	93.8 (26)				
TLI	0.975	0.979				
CFI	0.986	0.988				
RMSEA (90% CI)	.067 (.052, .083)	.072 (.057, .088)				
SRMR	0.03	0.028				

Note. Primary loadings are bolded.

#### Exploratory Factor Analyses in a Confirmatory Environment (E/CFAs)

The E/CFAs were fit to the second sub-sample. The model submitted to the E/CFAs is similar to the EFAs, except that:

- Items 4 and 13 were selected as anchor items for Conforming and Nonconforming factors respectively for both sets of items.
- Correlations between residuals for Items 9 and 14, Items 12 and 13, and Items 2 and 7 were estimated.

Table 5 shows the standardized loadings,  $R^2$  values, factor correlations, and goodness-of-fit indices. For *Self-Perception of Public Self*, all primary loadings were greater than 0.6, and for *Ideal Public Self*, all primary loadings were greater than 0.58. Approximate fit indices indicated a good fit, and for *Self-Perception of Public Self*, the  $\chi^2$  was not statistically significant. There were no residual correlations greater than 0.10, and there were no large Modification Indices (MIs). For *Ideal Public Self*, two of the hypothesized correlations between residuals were small.

#### Confirmatory Factor Analyses (CFAs)

The CFAs were fit to the third sub-sample. The models were the same as those fit with the E/CFAs, except cross-loadings were fixed to zero. Not unexpectedly, when cross-loadings were fixed to zero, the fit deteriorated. For both models, the  $\chi^2$  were significant, and for *Self-Perception of Public Self*, RMSEA exceeded 0.08. Modification Indices did not indicate that any cross-loadings should be estimated, but the largest MI in both models indicated that the correlation between the residuals for Items 4 and 5 be estimated. This was a pair of items that earlier we argued could have their residuals correlated. Table 6 shows the standardized loadings,  $R^2$  values, and goodness-of-fit indices for the revised models.

Table 5. Two-factor Structure of Self-Perception and Ideal Public Self Items of the Social Identity Scales from E/CFAs

Item	Self-Perception			Ideal Public Self		
	F1	F2	R <sup>2</sup>	F1	F2	R <sup>2</sup>
2 Trouble	<b>0.747</b>	-0.034	0.543	<b>0.814</b>	-0.139	0.573
6 Annoying	0.602	-0.005	0.361	<b>0.794</b>	-0.177	0.527
7 Disobey	<b>0.796</b>	-0.103	0.59	<b>0.871</b>	-0.136	0.663
9 Bad reputation	<b>0.824</b>	-0.036	0.661	<b>0.839</b>	-0.009	0.697
12 Bully	<b>0.788</b>	-0.029	0.608	<b>0.785</b>	-0.057	0.576
13 Bad	<b>0.877</b>	0	0.768	<b>0.83</b>	0	0.689
3 Good	0.161	<b>0.721</b>	0.621	0.082	<b>0.827</b>	0.756
4 Get along	0	<b>0.802</b>	0.643	0	<b>0.861</b>	0.742
5 Team	-0.021	<b>0.736</b>	0.532	<b>-0.047</b>	<b>0.814</b>	0.629
14 Good reputation	0.216	<b>0.611</b>	0.507	0.229	<b>0.586</b>	0.526
<b>Correlations between residuals</b>						
Item 9 & 14	0.382	0.041				
Items 2 & 7	0.236	0.048				
Items 12 & 13	0.352	0.574				
Factor correlation	0.326	0.482				
$\chi^2$ (df)	33.5 (23)	47.2 (23)				
TLI	0.994	0.989				
CFI	0.997	0.995				
RMSEA (90% CI)	.030 (0, .051)	.046 (.027, .064)				
SRMR	0.019	0.022				

Note. Primary loadings are bolded.

For *Self-Perception of Public Self*, approximate fit indices were good (although the upper end of the 90% CI was greater than 0.08). There were residuals greater than 0.1 (the three largest were 0.165, 0.157, and 0.147 between Items 2 and 5, Items 7 and 5, and Items 2 and 4), and the  $\chi^2$  was significant. For *Ideal Public Self*, approximate fit indices were good. There were no residuals greater than 0.1, but the  $\chi^2$  was significant. In both cases, the largest Modification Index was greater than 10 and suggested that the correlation between the residuals for Items 3 and 14 be estimated. There were no convergence issues when the re-specified models were run, but there were problems with some estimates, mainly involving Item 3, more so for *Self-Perception* than for *Ideal Public Self*. Item 3 had an extremely high loading (and therefore very small residual variance), the correlation between the residuals for Items 3 and 14 were contrary to what was expected, and less than minus one. There were no obvious reasons for these aberrant estimates. Therefore, the previous models (the models shown in Table 6) were taken to be the preferred models.

Table 6. Two-factor Structure of Self-Perception and Ideal Public Self Items of the Social Identity Scales from Confirmatory Factor Analysis

Item	Self-Perception			Ideal Public Self		
	F1	F2	R <sup>2</sup>	F1	F2	R <sup>2</sup>
2 Trouble	0.698		0.487	0.772		0.521
6 Annoying	0.63		0.397	0.704		0.495
7 Disobey	0.732		0.536	0.777		0.603
9 Bad reputation	0.82		0.673	0.842		0.709
12 Bully	0.766		0.587	0.798		0.636
13 Bad	0.882		0.778	0.908		0.824
3 Good		0.858	0.737		0.886	0.784
4 Get along		0.603	0.364		0.76	0.578
5 Team		0.565	0.32		0.769	0.592
14 Good reputation		0.742	0.55		0.779	0.606
<b>Correlations between residuals</b>						
Item 9 & 14	0.515	0.346				
Items 2 & 7	0.327	0.232				
Items 12 & 13	0.245	0.334				
Items 4 & 5	0.432	0.395				
Factor correlation	0.487	0.51				
$\chi^2$ (df)	116.9 (30)	72.8 (30)				
TLI	0.965	0.988				
CFI	0.977	0.992				
RMSEA (90% CI)	.076 (.062, .091)	.053 (.038, .069)				
SRMR	0.053	0.039				



### Reliability and Validity

Table 7 shows values for reliability ( $\omega$ -3 and 95% CIs) and convergent validity (AVE), factor determinacy, and construct replicability (H). Reliabilities (greater than 0.80) were mostly good, but for the *Conforming* subscale of *Self-Perception of Public Self Scale*, the value was a little less than 0.80. Convergent validity was mostly good (AVEs greater than 0.50) but for the *Conforming* subscale of *Self-Perception of Public Self Scale*, the value was less than the recommended cut-off, but only just. Discriminant validity was good: for both scales, both AVEs were greater than the square of the correlation between factors (0.237 and 0.260 respectively). Using the 0.90 cut-off, factor determinacy was good for all scales, indicating that factor scores are trustworthy. Similarly, using a cut-off of 0.70, factor replicability was good for all scales, indicating that latent factors are well represented by their respective items.

Table 7. Composite Reliabilities ( $\omega$ -3 and 95% CIs), Convergent Validity (AVE), Factor Determinacy, and Construct Replicability (H)

Scale	$\omega$ -3 (95% CI)	AVE	Determinacy	H
<b>Self-Perception</b>				
Conforming	.783 (.744, .814)	0.492	0.914	0.835
Nonconforming	.854 (.824, .878)	0.577	0.952	0.907
<b>Ideal Public Self</b>				
Conforming	.841 (.809, .866)	0.64	0.943	0.889
Nonconforming	.870 (.836, .895)	0.632	0.962	0.926

Regarding the *Self-Perception of Public Self scale*, Items 4 and 5 have somewhat smaller loadings than Items 3 and 14 (see Table 6), sufficiently small to put the AVE for *Conforming* subscale less than 0.50. One option for improving the AVE is to use the previous model (with the correlation between the residuals for Items 4 and 5 fixed to zero). However, the global fit indices deteriorated, and there were severe problems with local fit (the residual correlations). An alternative is to note that Item 5 is the poorest performing item ( $R^2 = 0.32$ ). A case could be made to drop Item 5 from the analysis. However, rather than use a three-item factor, we will accept an AVE that is marginally less than the recommended value.

### Measurement Invariance

Tables 8a and 8b show results of assessment of measurement invariance across Gender and Age groupings for *Self-Perception of Public Self* and *Ideal Public Self* scales respectively. In each case, the configural model is established in each group separately (Models 1A and 1B), then the goodness-of-fit indices indicate that configural invariance (Model 2) is established. We then compared the configural invariance model (Model 2) to the more constrained metric invariance model (Model 3). Using Satorra-Bentler scaled difference in  $\chi^2$  ( $\Delta\chi^2$ ) to examine these models, we found no significant deterioration in fit between the two models; establishing metric invariance. Similarly, comparing the metric invariance model (Model 3) to the more constrained scalar invariance model (Model 4), we found no significant deterioration in fit between models, thus establishing scalar invariance. Though it is not essential to establish strict invariance to compare latent means, Table 8a shows that strict invariance was established across Gender and Age groupings for *Self-Perception of Public Self*, and partial strict invariance was established across Gender and Age groupings for *Ideal Public Self*. Tables 8a and 8b show goodness-of-fit indices were mostly good for all models for both scales. The exception is RMSEA—for a few models—RMSEA is greater than 0.80, indicating only a mediocre fit. Finally, latent means for each group were compared. Strict or partial strict invariance model (Model 5 or 5A) was compared (using  $\Delta\chi^2$  criterion) to a more constrained model where means across groups were constrained to equality. In case of a significant deterioration in fit, means for each factor were constrained to equality across groups to determine whether means differ on one or other or both scales (p-values were adjusted to account for multiple testing). Table 9 presents the comparisons.

Table 8a. Testing Measurement Invariance Across Gender and Age Groupings for *Self-Perception*

Model	$\chi^2$	df	$\Delta\chi^2$	$\Delta$ df	p	CFI	TLI	RMSEA	SRMR
<b>Gender</b>									
1A_Female	86.77	30	-	-	-	0.966	0.95	0.089	0.063
1B_Male	67.81	30	-	-	-	0.981	0.971	0.07	0.056
2_Configural	153.53	60	-	-	-	0.975	0.962	0.079	0.059
3_Metric	158.56	68	9.71	8	0.286	0.975	0.967	0.073	0.06
4_Scalar	184.21	86	25.48	18	0.112	0.973	0.972	0.068	0.062
5_Strict	203.27	100	17.68	14	0.222	0.972	0.975	0.064	0.065
<b>Age</b>									
1A_Junior	71.07	30	-	-	-	0.98	0.97	0.073	0.053
1B_Senior	91.75	30	-	-	-	0.967	0.95	0.093	0.072
2_Configural	164.57	60	-	-	-	0.973	0.96	0.083	0.062
3_Metric	170.46	68	10.33	8	0.243	0.974	0.965	0.078	0.063
4_Scalar	198.83	86	26.04	18	0.099	0.971	0.97	0.072	0.064
5_Strict	212.18	100	14.09	14	0.443	0.971	0.974	0.067	0.067

As shown in Table 9, first, for both scales, latent means did not differ across Age groupings. Second, with respect to *Self-Perception of Public Self*, there was a difference in latent means for boys and girls but for the *Nonconforming* subscale only: the mean for girls was higher than for boys (Cohen's  $d=0.332$ ). That is, girls perceived themselves as less delinquent than boys. Third, with respect to *Ideal Public Self*, latent means for boys and girls differed on both *Conforming* and *Nonconforming* subscales. Girls had a stronger desire—compared to boys—to be seen by their friends as displaying higher levels of *Conforming* character traits (Cohen's  $d=0.326$ ) and lower levels of delinquent character traits (Cohen's  $d=0.462$ ).

Table 9. Differences in Latent Means between Gender and Age Groupings for Social Identity Scales

Scale	$\Delta\chi^2$	$\Delta df$	p	Holm's adj p
<b>Gender</b>				
Self-Perception	9.46	2	0.009	
Conforming	0.94	1		0.332
Nonconforming	8.05	1		0.009
<b>Age</b>				
Self-Perception	0.85	2	0.653	
<b>Gender</b>				
Ideal Public Self	14.58	2	<.001	
Conforming	1.12	1		0.013
Nonconforming	21.94	1		0.002
<b>Age</b>				
Ideal Public Self	3.17	2	0.205	

## Discussion

### Validity of the Measure

The use of a valid research instrument is critical in studies that attempt to assess constructs such as social identity of adolescents in mainstream school settings. This is particularly true given the physiological, emotional, and social changes that occur during puberty. Measures designed for an adult or college-age population are not necessarily appropriate for high-school age populations. The purpose of the present study was to validate a new Adolescent Social Identity measure for mainstream school settings that uses adapted scales from a validated reputation enhancement scale. The Social Identity measure comprised two constructs, *Self-Perception of Public Self* and *Ideal Public Self*. Both constructs were designed to comprise two sub-constructs: *Conforming* and *Nonconforming*. The sample was randomly divided into three sub-samples to analyse the factorial validity of the social identity measure. An EFA was performed on the first sub-sample to determine the underlying factors, an EFA in a confirmatory framework was performed on the second sub-sample, and a CFA on the third sub-sample. A two-factor structure was confirmed. Model fit for the final CFA models were adequate; somewhat better for *Ideal Public Self*, somewhat worse for *Self-perception of Public Self*. The *Conforming* and *Nonconforming* subscales for both scales were shown to be reliable and valid.

In addition to determining the validity of this measure, the study also tested its invariance across age and gender. Measurement invariance across age and gender groupings was established for both scales.

### Age Differences

Findings showed that latent means did not differ across age groupings. That is, there was no significant age-developmental difference between junior (age 12–13) and senior groups (age 14–17) on how adolescents think that their peers view them (*Self-perception of Public Self*) and how they would ideally like to be viewed by peers (*Ideal Public Self*) regarding their conforming and nonconforming behaviour and reputational status. In contrast to the findings reported by Carroll et al. (2003), where junior high school students exhibited higher scores in nonconforming self-perception, ideal public self, and engagement in delinquent behaviours compared to senior high school students, the present study revealed different results. Although the present study does not show the developmental change, the importance of peers is worth noting through research on peer influence on adolescent behaviours and identity formation. Early adolescence is regarded as a period of increased compliance with peer influence to be integrated into the peer group, promote interpersonal and intragroup compatibility, and reduce differences resulting in social exclusion (Laursen & Veenstra, 2021; Tomova et al., 2021). Incongruent with our findings, accumulating evidence has found that the developmental change of susceptibility to peer influence for delinquency and at-risk behaviours rises during early adolescence, around ages 10–14 (Reiter et al., 2021; Steinberg & Monahan, 2007; Sumter et al., 2009). Steinberg and Monahan (2007) examined age differences in resistance to peer influence of 3,600 participants (age 10–30). They found resistance to peer influences increases significantly during middle adolescence (age 14–18) when young people develop the capacity to stand up for what they believe, resist peer pressure, and not conform to peer opinions. By contrast, little evidence shows the development of such resistance to peer influence in the ages 10–14 and 18–30.

In a study of healthy adolescents by Reiter et al. (2021), susceptibility to peer influences did not relate significantly to maladaptive behaviour such as substance consumption, delinquency, real-life risk-taking, unprotected sexual intercourse, and self-harming behaviours. They suggested that impact of peer influence on adolescents depends on the nature of that social or peer influence. For example, when the influence is exerted by positive role models or peers, adolescents, being behaviourally responsive to peers, will lead to successful social adaptation in real life. Instead of looking at age difference, the issue of peer influence on social identity and behaviour can be better understood through adolescent experiences of identity development. Dumas et al. (2012) discovered that peer influence does have an impact on risk behaviours. However, they found that a strong sense of identity commitment and exploration can serve as protective factors against engaging in risky behaviours, especially in situations where peer pressure is particularly intense. These findings suggest that development of adolescent identity plays a crucial role in mitigating negative effects of peer pressure, particularly those at high risk for engaging in risky behaviours. This finding complements prior research revealing a stable or strong identity commitment is positively related to adolescents' social identity formation (Albarello et al., 2018).

### *Gender Differences*

Differences were found across gender groups in the present study. There was a difference in the latent means for boys and girls for the *Nonconforming* subscale of the *Self-perception of Public Self Scale*. These findings suggest that girls perceived themselves as having less delinquent character traits compared to boys. There was also a difference in the latent means for boys and girls on both the *Conforming* and *Nonconforming* subscales of the *Ideal Public Self Scale*. These findings suggest that girls had a stronger desire, compared to boys, to be seen by their friends as displaying higher levels of *Conforming* character traits and lower levels of delinquent character traits. The results corroborate the findings of Carroll et al. (2003), indicating that compared to boys, female high school students tend to seek a reputation that is more conforming, characterized by positive traits such as being friendly and easy going. They ideally prefer to be perceived by peers as trustworthy and loyal, and are more likely to engage in behaviours that align with this reputation.

Consistent with the gender difference findings, is social connectedness and identity formation. In a study by Ja and Jose (2017), it was revealed that girls reported a higher sense of connectedness to friends, peers, school, and teachers in comparison to boys. This concurs with Karcher and Sass (2010) and McGraw et al. (2008). Peer connections have a more pronounced positive impact on girls compared to boys in reducing the state of "lostness" and developing knowledge about self as they feel emotionally supported, trusted, accepted, and connected (Ja & Jose, 2017). Previous investigations by Bourgeois et al. (2014) determined that boys and girls used social media differently in developing connections and promoting an ideal public self to peers. Despite having a stronger need for connecting with peers and feeling like they belong, girls would like to be perceived as more conforming with less delinquent character traits.

In a longitudinal study conducted by Crocetti et al. (2019), the self-perception of adolescents regarding morality, competence, and sociability was investigated, with a particular focus on gender differences. Findings revealed that girls tend to exhibit increases in morality (correct social behaviour, honesty, and trustworthiness) and a decrease in sociability (ability to establish positive relationships). Moreover, girls attribute a high level of importance to morality in their development, whereas boys appear to prioritise sociability more. This suggests that in terms of developmental trajectories, girls are motivated to be perceived as having 'correct' or conforming behaviours more than being good at building good relationships. Similarly, Sumter et al. (2009) found that gender differences are more evident during mid-adolescence (13–15 years) than those in 10–12 years and 16–18 years, when girls were more resistant to peer influence than boys. Numerous studies on early psychosocial maturity consistently reveal age-by-gender interaction effects, indicating that girls tend to mature earlier than boys during mid-adolescence, while boys catch up with girls during late adolescence (Eisenberg et al., 1991).

### *Practical Applications to Educational Practice*

With regards to the findings of the present study, researchers, education departments and schools can gain a better understanding of students' self-perceptions of Public Self in synchrony with Ideal Public Self. This would help in identifying the conforming and nonconforming reputation and potential risks of young people becoming involved in delinquency. As a result, proactive and appropriate intervention strategies may be provided to meet social and emotional needs and prevent possible risk-taking behaviours. Strategies for promoting identity exploration and commitment should be embedded in curriculum practice and social-emotional well-being programs, especially targeting the needs of male students. With adequate experiences, adolescents' identity commitment may become positive and strong, reducing the negative effect of peer pressure especially engaging in risk behaviours (Albarello et al., 2018; Dumas et al., 2012).

### **Conclusion**

This study has revealed that the social identity measure has the potential to provide researchers with a reliable and theoretically grounded tool when assessing adolescent social identity in school settings. While findings do not show marked developmental differences between junior and senior high school students on how they perceive themselves in conforming and nonconforming behaviour and their reputational status, it is worth underscoring the effect of peer

influence on social identity. Furthermore, the present study identified significant differences across gender groups.

Consistent with much research, the findings suggest that girls perceived themselves as having less delinquent character traits compared to boys, as shown in the *Nonconforming* subscale of the *Self-perception of Public Self Scale*. Girls also had a stronger desire, compared to boys, to be seen by peers as displaying higher levels of conforming character traits and lower levels of delinquent character traits. Adolescents often tend to avoid social exclusion and loneliness that might lead to heightened peer influences on their identity formation and a range of behaviours, from health risk taking to prosocial and healthy behaviours depending on the peer group norm (Tomova et al., 2021). Thus, the presence of positive role models and peers is crucial in facilitating adolescents' prosocial perception and conforming behaviour (Reiter et al., 2021).

### Recommendations

A cross-sectional study was sufficient to validate the measure. However, future research should consider longitudinal studies to investigate individual trajectories to understand both within and between differences over time (Sullivan & Calderwood, 2017). Moreover, future research that examines strategies by which adolescents' social cognition and reputation are achieved in different contexts (e.g., school, social media), the constraints of the strategies, and the potential resulting problems in their identity development and adaptive and social behaviours would give insights into how schools and policy makers can provide prompt intervention for at-risk adolescents.

### Limitations

Despite the contribution this research makes to measuring social identity with adolescents in high school settings, some limitations should be considered. First, the measure relies on self-reporting and thus the data may be biased due to social desirability responses (Kreitchmann et al., 2019). Careful consideration should be taken regarding school implications especially with contributing factors of gender and age. Second, this study only included state school students limiting generalizability of findings and validation of the measure for students in other school types. Third, there were fewer *Conforming* items due to dropping items that failed to meet statistical criteria. In the future, studies might incorporate a broader range of items and employ diverse methodological approaches (McLean et al., 2016).

### Ethics Statement

The research involving human participants underwent thorough reviewed and approval by the Human Research Ethics Committee from the Queensland Department of Education and The University of Queensland. Prior to participating in the study, all participants provided written informed consent, indicating their voluntary agreement to participate.

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### Author Contribution Statement:

Carroll: Senior supervisor, conceptualised and designed the project, and contributed to data analysis, interpretation, and writing. Bower: Assisted in the original conception and design of the study, and the writing of the manuscript. Povey and Muspratt: Involved in the statistical analysis and interpretation of the study and the writing of methods and results. Chen: Involved in the literature review, discussion, and final drafting of the manuscript.

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