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Original Article

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Factor Structure, Measurement Invariance, and Associations with Identity, Personality Traits, and Borderline Personality Features

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Abstract: Identity difficulties have been associated with various psychiatric conditions and are considered a central issue in personality pathology. Following the Alternative Model for Personality Disorders, measures of self- and interpersonal functioning have been developed. Although these measures were intended to be separate ratings of self-other deficits, only a global rating was obtained. Moreover, these measures fall short in bridging the gap between developmental and clinical identity work. To capture both adaptive and disturbed identity dimensions, Kaufman et al. (2015) developed the Self-Concept and Identity Measure (SCIM) that assesses consolidated identity, disturbed identity, and lack of identity. Using two-wave longitudinal data (2,150 adolescents; 54.2% girls; age range = 12–19), this study investigated the factor structure and reliability of the Dutch SCIM, its measurement invariance across time, its longitudinal measurement invariance across gender and age groups, and associations of the SCIM with identity synthesis and confusion, Big-Five personality traits, and borderline personality disorder features. Consolidated identity scores were positively related to identity synthesis and adaptive Big-Five traits, whereas negatively related to identity confusion, neuroticism, and borderline features. Opposite associations were obtained for disturbed identity and lack of identity scores. The Dutch SCIM appeared to produce valid and reliable scores and seemed suited to assess longitudinal identity functioning in Belgian adolescents.

Keywords: SCIM, identity, adolescence, factor structure, longitudinal measurement invariance

A Dimensional Perspective on Identity

Identity development emerges in childhood, significantly evolves in adolescence and emerging adulthood, and continues to develop throughout adulthood (Arnett, 2000; Erikson, 1968). Although feelings of identity confusion may occasionally surface (especially in adolescence), most individuals manage to construct a synthesized identity by late adolescence or young adulthood (Erikson, 1968; Luyckx et al., 2013). However, some individuals seem unable to develop a mature identity. Associations between identity difficulties and psychiatric conditions have been repeatedly established (van Doeselaar et al., 2018).

Moreover, identity has a prominent role in the Alternative Model for Personality Disorders (AMPD) in Section III of the DSM-5, which is based on two criteria (American Psychiatric Association [APA], 2013). Criterion A characterizes personality disorders in terms of impairment in self-functioning (identity and self-direction) and interpersonal relatedness (empathy and intimacy), while Criterion B characterizes personality disorders in terms of pathological personality traits. Criterion B traits are organized into five trait domains (Negative Affectivity, Detachment, Antagonism, Disinhibition, and Psychoticism), overarching 25 trait facets, and representing the pathological versions of the Five-Factor Model domains (Costa & McCrae, 1992).

Interestingly, Criterion A deficits are considered on a continuum of severity, ranging from no to extreme impairment (APA, 2013).

As a dimensional perspective on identity has gained a greater footing in the DSM, it seems timely to focus on instruments assessing both adaptive and disturbed dimensions of identity. Although upcoming research focuses on how Criterion A measures are associated with personality pathology, these measures often fail to disentangle deficits in self-functioning from interpersonal problems, which have shown to be strongly intertwined (Cruitt et al., 2019). Moreover, these measures fall short in bridging the gap between developmental and clinical identity conceptualizations. Although developmental researchers have established a rich theoretical and empirical knowledge, clinical scientists are often unfamiliar with these findings, and vice versa, limiting progress in both areas.

The Self-Concept and Identity Measure

In an attempt to integrate developmental and clinical perspectives, Kaufman and colleagues (2015) developed the Self-Concept and Identity Measure (SCIM), comprising three subscales. The *consolidated identity* scale represents healthy identity functioning, measuring a sense of knowing who you are, identity commitments, consistency in beliefs and values, and positive self-worth. Borrowing from developmental and clinical identity theories, the *disturbed identity* scale measures various identity-related struggles, from normative and adaptive periods of uncertainty to severe and long-lasting identity difficulties. The *lack of identity* scale assesses feelings of inner emptiness, non-existence, and being broken. SCIM items are presented in Table E1 in Electronic Supplementary Material 1 (ESM 1).

The SCIM's three-factor structure has been validated in two American and three Belgian adult community samples (Bogaerts et al., 2018; Kaufman et al., 2015), and one American clinical sample (Kaufman et al., 2019). Different from the American studies, items 11 and 16 demonstrated low factor loadings on consolidated identity in all Belgian samples. Additionally, many Belgian respondents answered *I don't know* to items 3 and 14. Although we decided to retain these four items, we did remove the answer option *I don't know* to encourage adolescents to respond to all items.

Across American and Belgian studies, alpha coefficients ranged between .65 and .76 for consolidated identity, .81 and .86 for disturbed identity, and .87 and .92 for lack of identity. Consolidated identity scores were negatively associated with disturbed identity and lack of identity scores, whereas disturbed identity and lack of identity scores were positively associated. Furthermore, elevated scores on disturbed identity and lack of identity were related to clinically-relevant outcomes such as emotion dysregulation and symptoms of anxiety and depression (Bogaerts et al., 2018; Kaufman et al., 2015, 2019).

Research on gender and age differences in SCIM scores is limited to a recent study in adults (Bogaerts et al., 2020). This study indicated no gender differences and demonstrated that consolidated identity and disturbed identity scores were respectively positively and negatively related to age, whereas lack of identity scores was unrelated to age. Research on gender and age differences in SCIM scores in adolescents is virtually absent. In addition, previous studies in adolescents exploring gender and age differences in SCIM-related variables have yielded inconsistent findings. Concerning gender, a study by Bogaerts et al. (2019) indicated that boys reported higher scores on identity synthesis and commitment processes (conceptually similar to consolidated identity) and lower scores on identity confusion (conceptually similar to disturbed identity) than girls. In contrast, Klimstra et al. (2010) and Becht et al. (2016) reported no gender differences in commitment processes in adolescents. Concerning age, a study reviewing identity development in adolescence and young adulthood concluded a stable or increasing trend in identity continuity (conceptually similar to consolidated identity; van Doeselaar et al., 2018). Based on these findings, studies evaluating measurement invariance of identity scores across gender and age are needed.

Although the SCIM appears to be a promising tool for measuring identity functioning among adults, research on its psychometric properties in adolescents lacks when in fact adolescence is considered to be a transitional period in life, in which biological, psychological, and social changes demand identity exploration and commitment (Erikson, 1968). In addition, identity impairment is considered a transdiagnostic marker of psychopathology and has been elevated to a core feature of all personality disorders in the AMPD (APA, 2013; Klimstra & Denissen, 2017). However, the directionality of associations between identity and psychopathology is largely unexamined. To gain insight into identity development and its over-time associations, longitudinal measurement invariance of scores on measures of identity and psychopathology has to be established. Accordingly, the present study examined the factor structure and reliability of the Dutch SCIM, its measurement invariance across two-time points with a one-year interval, and its longitudinal measurement invariance across gender and age groups (12–14, 15–16, and 17–19-year olds) in adolescents. Furthermore, to evaluate convergent validity, this study investigated associations of SCIM scores with the identity subscale of the Erikson Psychosocial Stage Inventory (EPSI; Rosenthal et al., 1981). Based on previous findings (Bogaerts et al., 2018), we expected consolidated

identity scores to be positively associated with identity synthesis and negatively with identity confusion, whereas opposite associations were expected for disturbed identity and a lack of identity scores.

Identity and Personality Traits

In light of identity's role within the AMPD, we were interested in associations of SCIM scores with personality traits. Generally, the core of personality can be subsumed into five traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism (McCrae & Costa, 1987). The traits delineating personality are continuous, and some authors suggest that personality disorders can be characterized by the presence of extreme levels of these personality traits (e.g., Samuel & Widiger, 2008).

To date, the few studies that have examined associations between identity and personality traits among adolescents indicated that identity commitment (conceptually similar to consolidated identity) was positively related to openness, conscientiousness, extraversion, and agreeableness, and negatively to neuroticism. Conversely, ruminating about identity alternatives (which can be an indication of a disturbed identity) was positively related to neuroticism, and negatively to extraversion and agreeableness (Klimstra et al., 2013; Luyckx et al., 2014). A study by Westen et al. (2011) indicated that identity disturbance was positively associated with severe personality pathology in a clinical adolescent sample.

Similarly, studies in adults have illustrated that identity impairment was positively associated with neuroticism, and negatively with conscientiousness, extraversion, and agreeableness (Bastiaansen et al., 2013; Cruitt et al., 2019). Furthermore, disturbed identity and lack of identity scores were positively related to personality disorder symptoms, whereas consolidated identity scores were negatively related to personality disorder symptoms (Bogaerts et al., 2020).

Although insightful, studies in adolescents have mainly focused on normative identity processes and may not account for severely disturbed identity functioning, as captured by the lack of identity scale. Research focusing on how adaptive and disturbed identity functioning is related to personality pathology has been carried out in adults exclusively, presumably because the assessment and/or diagnosis of personality disorders in adolescents is still considered controversial. To address this, the current study investigated associations of SCIM scores with Big-Five personality traits and borderline personality disorder features in an adolescent sample. We expected consolidated identity scores to be positively related to openness, conscientiousness, extraversion, and agreeableness, and negatively to neuroticism and borderline features. Opposite associations were expected for disturbed identity and lack of identity scores.

Methods

Participants and Procedure

The present two-wave longitudinal study is part of the Longitudinal Study on Identity in Adolescents (Buelens et al., 2020), approved by the ethical committee of the Faculty of Psychology and Educational Sciences of KU Leuven. Using convenience sampling, data were collected from high school students, recruited from eight secondary schools, which are located in Flanders, the Dutch-speaking part of Belgium. Initially, we reached out to the parents of 3,483 students and provided them with information about the study as students younger than 18 years needed active parental consent to participate. A total of 2,313 students (66.4%) received parental consent, of whom 2,162 (93.5%) signed the informed assent form and participated. Because students younger than 12 years and older than 19 years were underrepresented, they were excluded from the current sample.

Eventually, the present study included 2,150 students at the first (Time 1 [T1]; 54.2% girls) and 1,927 students at the second measurement time (Time 2 [T2]; 55.2% girls; 89.63% retention rate). The time interval between T1 and T2 was one year. Mean age was 14.68 at T1 (SD = 1.85, range = 12–19) and 15.6 year at T2 (SD = 1.81, range = 13–20). Surveys were completed online or using paper and pencil during school hours. We administered two versions of our survey as we were careful not to overburden students with questionnaires, and students had to be able to finish the survey within 50 min. While all students completed identity measures, approximately 75% of our sample completed the personality measures. At T2, students who graduated switched schools, or were absent during data collection were invited by letter and e-mail to complete the surveys online. Participating students received a movie ticket. To ensure anonymity, students' names were replaced by a code.

At T1, about one-third of the students (34.3%) were in their first or second year of secondary school, and all enrolled in the same general education program. Students in their third, fourth, fifth, and sixth years (17.1%, 17.8%, 18.7%, and 12%, respectively) were distributed among general, technical, and art education programs. The majority of the students had Belgian nationality (n = 1,919, 89.3%), whereas 5% had Dutch (n = 108) or another nationality (n = 108, 5%; 0.7% undisclosed). All students were fluent in Dutch, the language in which the surveys were administered. Of all students, 68.2% lived with both parents, 20.3% had divorced parents, 6.7% lived in a reconstituted family, 1.6% reported that one of their parents was deceased, and 2.8% reported that they lived in another (unspecified) home environment (0.4% undisclosed).

Instruments

Identity

Adolescents completed the Dutch SCIM (Bogaerts et al., 2018; Kaufman et al., 2015) to assess adaptive and disturbed dimensions of identity. The Dutch SCIM consists of 27 self-report items that measure consolidated identity, disturbed identity, and lack of identity. Items were rated on a scale from 1 (= *completely disagree*) to 7 (= *completely agree*).

Identity was also assessed using the identity subscale from the EPSI (Rosenthal et al., 1981; Schwartz et al., 2009). This scale consists of two subscales, identity synthesis and confusion, each measured with six items to be rated from 1 (= *strongly disagree*) to 5 (= *strongly agree*). Alpha coefficients were .75 and .67 at T1, and .79 and .74 at T2. The α for identity confusion at T1 may reflect inadequate reliability (George & Mallery, 2003), but is equal or higher than alpha values observed in previous adolescent studies (e.g., Gandhi et al., 2016).

Personality Traits

Close to 75% of our sample additionally completed personality measures. This subgroup completed the 25-item Big-Five Inventory that assesses openness, conscientiousness, extraversion, agreeableness, and neuroticism (BFI; Gerlitz & Schupp, 2005). Each trait is measured by five items to be rated from 1 (= *completely false*) to 5 (= *completely true*). Alpha coefficients ranged between .63 (agreeableness) and .80/.81 (neuroticism) at T1 and T2, respectively. A previous study in adolescents has reported similar alpha values for agreeableness (Klimstra et al., 2013).

Furthermore, they completed the 11-item Borderline Personality Features Scale for Children (BPFS-C; Sharp et al., 2014). Items were rated on a scale from 1 (= *not true at all*) to 5 (= *always true*). Alpha coefficients were .85 at T1 and .86 at T2.

Analytic Plan

First, we performed Confirmatory Factor Analyses (CFA) using robust maximum likelihood estimation (MLR) in Mplus 8.0 (Muthén & Muthén, 1998–2017) to evaluate the SCIM's factor structure at T1 and T2. Four criteria were used to evaluate model fit: (1) the Satorra-Bentler chi-square (S-Bχ^2), which should be as small as possible (Schermelleh-Engel et al., 2003), (2) the Comparative Fit Index (CFI) with values between .90 and .95 indicating acceptable fit and values above .95 indicating good fit, (3) the Tucker-Lewis Index (TLI) with values between .90 and .95 indicating acceptable fit and values above .95 indicating good fit, and (4) the Root Mean Square Error of Approximation (RMSEA) with values below .08 indicating acceptable fit and values below .06 indicating good fit (Kline, 2004; Marsh et al., 2004).

Second, we examined the internal consistency of SCIM scales using Cronbach's α and McDonald's ω coefficients. Alpha coefficients were reported to allow for comparison with previous research. George and Mallery (2003) suggest that alpha values above .70, .80, and .90 indicate respectively acceptable, good, and excellent reliability. Omega coefficients were reported to provide a more robust reliability estimate (since tau equivalence could not be assumed; Dunn et al., 2014). Omega coefficients measure whether subscale scores provide unique information above and beyond the total score (Rodriguez et al., 2016). When Omega values are high (> .80), total scores can be considered essentially unidimensional, in the sense that the vast majority of reliable variance is attributable to a single common source (Nunnally & Bernstein, 1994; Rodriguez et al., 2016). Furthermore, correlations between SCIM scores were analyzed using Pearson correlation coefficients, which were interpreted in accordance with the empirical guidelines of Hemphill (2003): coefficients below .20, between .20 and .30, and above .30 indicate respectively small, medium, and large effects.

Third, Structural Equation Modeling (SEM) using MLR was used to test (a) SCIM scores' measurement invariance across two-time points with a 1 year interval, (b) SCIM scores' measurement invariance across gender over time (i.e., comparing four groups: boys' scores at T1, boys' scores at T2, girls' scores at T1, and girls' scores at T2), and (c) SCIM scores' measurement invariance across age groups over time (i.e., comparing six groups: 12–14-year olds' scores at T1, 13–15-year olds' scores at T2, 15–16-year olds' scores at T1, 16–17-year olds' scores at T2, 17–19-year olds' scores at T1, and 18–20-year olds' scores at T2). Tests of measurement invariance examine whether an instrument measures the same construct across heterogeneous groups (Chen, 2007). In the present study, we tested for configural, metric, and scalar invariance. Configural invariance tests whether each latent factor is associated with identical items across time/groups. Metric invariance tests whether factor loadings of items on the underlying factor can be constrained to be equal across time/groups. Finally, scalar invariance tests whether intercepts can be constrained to be equal across time/groups (Chen, 2007). We relied on four fit indices to test for metric and scalar invariance, of which at least three should be satisfied: (1) change in the S-Bχ^2 (ΔS-Bχ^2), which uses a correction factor to account for non-normality and should be as small as possible (Schermelleh-Engel et al., 2003), (2) change in CFI (ΔCFI) with values below .01 indicating measurement invariance, (3) change in TLI (ΔTLI) with values below .01 indicating measurement invariance, and (4) change in

Table 1. Fit indices for testing Confirmatory Factor Analysis at Time 1 and Time 2

Model fit	S-Bχ^2 (*df*)	*p*	CFI	TLI	RMSEA [90% CI]
3 factors including all items					
T1	2,698.431 (321)	< .001	.862	.849	.059 [.057, .061]
T2	2,811.119 (321)	< .001	.842	.827	.064 [.061, .066]
3 factors excluding items 3, 11, 16, and 18					
T1	1,921.312 (227)	< .001	.893	.881	.059 [.057, .062]
T2	1,953.357 (227)	< .001	.875	.861	.063 [.060, .066]
3 factors excluding items 3, 11, 16, and 18, and including four error correlations (see Table 2)					
T1	1,298.241 (223)	< .001	.932	.923	.048 [.045, .050]
T2	1,416.204 (223)	< .001	.914	.902	.053 [.050, .055]

Note. S-Bχ^2 = Satorra-Bentler chi-square; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

RMSEA (ΔRMSEA) with values below .015 indicating measurement invariance (Chen, 2007).

Fourth, if SEM models pointed to (partial) scalar measurement invariance across gender and/or age groups, we compared latent mean differences across these groups at both time points. To compare latent means across gender, we constrained boys' latent means to zero, and girls' latent means were freely estimated. To examine latent mean differences among the three age groups, we first set the early adolescent's latent means to zero and allowed the mid-adolescent's and late adolescent's latent means to be freely estimated, generating latent means comparisons between early and mid-adolescents and between early and late adolescents. The mid-adolescent's latent means were then constrained to zero, and the late adolescent's latent means were allowed to be freely estimated, which allowed us to also examine latent mean differences between mid- and late adolescents. To determine whether there was a significant difference between the latent means across groups, the *z* statistic was used.

Fifth, associations of SCIM scores with identity synthesis and confusion, Big-Five personality traits, and borderline personality disorder features were analyzed using Pearson correlation analyses and correlation coefficients were interpreted in line with Hemphill's guidelines (2003).

Results

Preliminary Analyses

Percentages of missing data ranged between 0.2% and 1.56% at T1 and between 0.14% and 1.56% at T2. As these percentages were below 5%, results were unlikely to be biased due to missing data (Jakobsen et al., 2017). Consequently, we used the Full Information Maximum Likelihood (FIML) approach to handle missing data (Schafer & Graham, 2002).

Factor Structure and Reliability of SCIM Scores

The CFA results at T1 and T2 are summarized in Table 1. A CFA including all items indicated that the three-factor model had an inadequate fit. We excluded items 3, 11, and 16 from the consolidated identity scale and item 18 from the disturbed identity scale at both measurement points because of low factor loadings (< .35; Kline, 2004). This resulted in a better, but still inadequate fit (Table 1). Therefore, in the next step, we included one error correlation between related items from different latent factors (items 1–7) and three error correlations between related items within a single latent factor (items 4–10; 13–20; and 23–26) that were suggested by the modification indices at T1 and T2. These pairs of items show a high degree of overlap in content (see Table E1 in ESM 1), which can trigger correlated errors (Byrne, 2001). Additionally, the allowed error correlations between the related items within a single latent factor were identical to those previously identified in Belgian samples (Bogaerts et al., 2018). Ultimately, the three-factor model had a good to excellent fit (Table 1). Descriptive statistics of SCIM scales at T1 and T2 are presented in Table 2.

Alpha and omega coefficients for SCIM scales at T1 and T2 are displayed in Table 2. Alpha coefficients for consolidated identity were acceptable to good (.75 and .78). Alpha coefficients for disturbed identity and lack of identity were good to excellent (ranging between .82 and .92; George & Mallery, 2003). Omega coefficients for consolidated identity, disturbed identity, and lack of identity ranged between .77 and .92, indicating good to excellent internal consistencies (Nunnally & Bernstein, 1994). Furthermore, consolidated identity scores were negatively associated with disturbed identity and lack of identity scores, whereas disturbed identity and lack of identity scores were positively associated with T1 and T2 (see Table 2). All correlations were moderate to large (ranging between −.49 and .73, $p < .001$; Hemphill, 2003).

Table 2. Descriptive statistics, internal consistency coefficients, and intercorrelations of study variables at Time 1 and Time 2

				Intercorrelations									
	M (*SD*)	Min–Max	α/ω	2	3	4	5	6	7	8	9	10	11
						Time 1							
1. Consolidated identity	4.82 (0.98)	1.29–7.00	.75/.77	−.49***	−.64***	.70***	−.56***	.29***	.39***	.36***	.37***	−.42***	−.52***
2. Disturbed identity	3.04 (1.00)	1.00–6.80	.82/.83		.62***	−.50***	.63***	−.12***	−.34***	−.25***	−.28***	.44***	.64***
3. Lack of identity	2.39 (1.43)	1.00–7.00	.92/.92			−.64***	.69***	−.10***	−.34***	−.38***	−.35***	.53***	.74***
4. Identity synthesis	3.65 (0.71)	1.00–5.00	.75				−.62***	.22***	.39***	.33***	.27***	−.43***	−.53***
5. Identity confusion	2.63 (0.71)	1.00–5.00	.67					−.05	−.32***	−.36***	−.27***	.51***	.65***
6. Openness	3.16 (0.89)	1.00–5.00	.79						.14***	.19***	.12***	−.14***	.02
7. Conscientiousness	3.14 (0.79)	1.00–5.00	.72							.13***	.34***	−.20***	−.41***
8. Extraversion	3.48 (0.82)	1.00–5.00	.76								.17***	−.29***	−.24***
9. Agreeableness	3.71 (0.69)	1.20–5.00	.63									−.23***	−.42***
10. Neuroticism	3.17 (0.95)	1.00–5.00	.80										.57***
11. Borderline features	1.55 (0.74)	0.00–3.82	.85										
						Time 2							
1. Consolidated identity	4.80 (0.99)	1.00–7.00	.78/.79	−.52***	−.66***	.73***	−.61***	.28***	.39***	.38***	.38***	−.45***	−.54***
2. Disturbed identity	3.00 (1.03)	1.00–6.80	.84/.84		.64***	−.51***	.66***	−.12***	−.32***	−.30***	−.29***	.46***	.65***
3. Lack of identity	2.52 (1.48)	1.00–7.00	.92/.92			−.68***	.73***	−.06*	−.31***	−.40***	−.31***	.54***	.73***
4. Identity synthesis	3.62 (0.72)	1.00–5.00	.79				−.69***	.21***	.38***	.38***	.28***	−.47***	−.56***
5. Identity confusion	2.63 (0.76)	1.00–4.83	.74					−.06*	−.36***	−.42***	−.28***	.52***	.69***
6. Openness	3.13 (0.89)	1.00–5.00	.78						.14***	.18***	.06*	−.10***	.01
7. Conscientiousness	3.13 (0.79)	1.00–5.00	.73							.12***	.31***	−.16***	−.38***
8. Extraversion	3.46 (0.86)	1.00–5.00	.80								.14***	−.32***	−.23***
9. Agreeableness	3.70 (0.68)	1.00–5.00	.63									−.20***	−.41***
10. Neuroticism	3.22 (0.95)	1.00–5.00	.81										.58***
11. Borderline features	1.59 (0.76)	0.00–3.82	.86										

Note. α = Cronbach's alpha; ω = McDonald's omega; *$p < .05$, ***$p < .001$.

Table 3. Fit indices for testing longitudinal measurement invariance

Model	S-Bχ^2 (*df*)	*p*	ΔS-Bχ^2 (*df*)	*p*	CFI	ΔCFI	TLI	ΔTLI	RMSEA [90% CI]	ΔRMSEA
Configural	2,732.711 (446)	< .001	–	–	.927	–	.917	–	.050 [.048, .052]	–
Metric	2,765.154 (469)	< .001	21.8748 (23)	.528	.926	.001	.921	.004	.049 [.047, .051]	.001
Scalar	,2867.959 (492)	< .001	93.8620 (23)	< .001	.924	.002	.922	.001	.049 [.047, .050]	0

Note. S-Bχ^2 = Satorra-Bentler chi-square; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

Table 4. Fit indices for testing longitudinal measurement invariance across gender and age groups

Model	S-Bχ^2 (*df*)	*p*	ΔS-Bχ^2 (*df*)	*p*	CFI	ΔCFI	TLI	ΔTLI	RMSEA [90% CI]	ΔRMSEA
Comparing boys and girls across T1 and T2										
Configural	3,205.000 (892)	< .001	–	–	.921	–	.910	–	.051 [.049, .052]	–
Metric	3,428.659 (961)	< .001	223.3372 (69)	< .001	.915	.006	.911	.001	.050 [.049, .052]	.001
Scalar	4,096.438 (1,030)	< .001	769.7147 (69)	< .001	.895	.020	.897	.014	.054 [.052, .056]	.004
Partial scalar	3,722.552 (1,009)	< .001	327.3551 (48)	< .001	.907	.008	.907	.004	.051 [.050, .053]	.001
Comparing early, mid-, and late adolescents across T1 and T2										
Configural	3,699.497 (1,338)	< .001	–	–	.925	–	.915	–	.051 [.049, .053]	–
Metric	3,877.326 (1,453)	< .001	166.9390 (115)	.001	.923	.002	.919	.004	.050 [.048, .052]	.001
Scalar	4,370.732 (1,568)	< .001	537.6128 (115)	< .001	.911	.012	.914	.005	.051 [.050, .053]	.001
Partial scalar	4,234.467 (1,553)	< .001	378.5729 (100)	< .001	.915	.008	.916	.003	.051 [.049, .052]	.001

Note. S-Bχ^2 = Satorra-Bentler chi-square; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation.

Longitudinal Measurement Invariance

Table 3 presents the goodness-of-fit statistics for measurement invariance of SCIM scores across the two-time points. First, a configural model was estimated, in which factor loadings and item intercepts were freely estimated across time points. The nonsignificant χ^2, CFI, and TLI values above .90, and RMSEA value below .06 indicated that configural invariance was established. Second, a metric model was estimated, in which factor loadings were constrained to be equal across time points. As the chi-square difference test comparing configural and metric models was non-significant and changes in CFI, TLI, and RMSEA values were below the proposed cut-off points, metric invariance was attained. Finally, a scalar model was estimated, in which factor loadings and item intercepts were equivalent across time points. As changes in CFI, TLI, and RMSEA values comparing metric and scalar models were below the proposed cut-off points, scalar invariance was established. The significant χ^2 difference test indicated that the model fit was affected by constraining intercepts to be equal across T1 and T2. However, this test has been revealed to be highly sensitive to sample size (Schermelleh-Engel et al., 2003).

Longitudinal Measurement Invariance Across Gender and Age Groups

Table 4 summarizes the fit indices for longitudinal measurement invariance of SCIM scores across gender and age groups. Across *gender*, the configural model had a good fit, judging by its CFI and TLI values above .90, and RMSEA value below .06. Restricting factor loadings to be equal across gender did not worsen model fit. Changes in CFI, TLI, and RMSEA values were below the cut-off points, indicating metric invariance. Finally, restricting intercepts to be equal across gender worsened model fit (ΔCFI = .020; ΔTLI = .014) and proved problematic for seven intercepts. Subsequently freeing the constraints on these intercepts iteratively (i.e., one by one through multiple re-examinations in the following order: 13, 5, 22, 25, 15, 20, and 8) supported partial scalar invariance (ΔCFI = .008; ΔTLI = .004). Noteworthy, five out of these seven items belong to the lack of identity scale.

Across *age groups*, the configural model had a good fit, judging by its CFI and TLI values above .90, and RMSEA value below .06. Restricting factor loadings to be equal across age groups did not worsen model fit as changes in CFI, TLI, and RMSEA values were below the cut-offs. Restricting intercepts to be equal across age groups worsened model fit (ΔCFI = .012) and proved problematic for three intercepts (i.e., intercepts of items 13, 19, and 25 in that order). Freeing the constraints on these intercepts one by one through multiple re-examinations of the modification indices supported partial scalar invariance (ΔCFI = .008).

In sum, the 23-item Dutch SCIM showed longitudinal measurement invariance across gender and age groups at the metric level, and partial measurement invariance at the scalar level. Based on these results, latent mean differences in SCIM scores could be compared across gender and age groups, although caution is warranted when investigating

gender differences in lack of identity scores. At both time points, latent mean analyses indicated that girls reported significantly lower consolidated identity scores (standardized $M = -0.41$, $Z = -7.42$, $p < .001$ at T1 and standardized $M = -0.48$, $Z = -8.04$, $p < .001$ at T2), and higher disturbed identity (standardized $M = 0.34$, $Z = 6.99$, $p < .001$ at T1 and standardized $M = 0.38$, $Z = 7.53$, $p < .001$ at T2) and lack of identity scores (standardized $M = 0.28$, $Z = 4.04$, $p < .001$ at T1 and standardized $M = 0.35$, $Z = 4.98$, $p < .001$ at T2) compared to boys.

Furthermore, with regard to latent mean differences in SCIM scores across age groups, analyses at T1 indicated that, compared to early adolescents, mid- and late adolescents scored significantly higher on lack of identity (standardized $M_{(\text{early vs. mid})} = 0.18$, $Z = 3.54$, $p < .001$; standardized $M_{(\text{early vs. late})} = 0.25$, $Z = 4.14$, $p < .001$). Furthermore, late adolescents scored significantly higher on lack of identity compared to mid-adolescents at T1 (standardized $M_{(\text{mid vs. late})} = 0.18$, $Z = 3.10$, $p < .01$). At T2, early and mid-adolescents did not significantly differ on their latent means. Late adolescents scored significantly higher on lack of identity compared to early adolescents (standardized $M_{(\text{early vs. late})} = 0.23$, $Z = 3.80$, $p < .001$) and mid-adolescents (standardized $M_{(\text{mid vs. late})} = 0.17$, $Z = 3.33$, $p < .01$).

Associations With Identity Synthesis and Confusion, and Personality Traits

Consolidated identity scores showed large positive correlations with identity synthesis, openness, conscientiousness, extraversion, and agreeableness, and large negative correlations with identity confusion, neuroticism, and borderline personality disorder feature at T1 and T2, as can be seen in Table 2 (Hemphill, 2003). Alternatively, disturbed identity and lack of identity scores yielded large negative correlations with identity synthesis, conscientiousness, extraversion, and agreeableness, and large positive correlations with identity confusion, neuroticism, and borderline personality disorder feature at T1 and T2. Both disturbed identity and lack of identity scores yielded small negative correlations with openness at T1 and T2.

Discussion

Given the relation of identity to a variety of psychiatric conditions and its central place within the AMPD – which adopts a dimensional perspective on identity –, research on the measurement of adaptive and disturbed dimensions of identity is a scientific priority. Accordingly, the present study examined the factor structure and reliability of the Dutch SCIM, measurement invariance of SCIM scores across two-time points, longitudinal measurement invariance of SCIM scores across gender and age groups, and associations of SCIM scores with identity formation, Big-Five traits, and borderline features among Belgian community adolescents.

The CFA results at T1 and T2 supported the SCIM's three-factor structure among adolescents (Bogaerts et al., 2018; Kaufman et al., 2015, 2019). In line with a previous study on the SCIM in Belgian adults (Bogaerts et al., 2018), items 11 and 16 demonstrated low factor loadings on consolidated identity. Additionally, this study pointed to low factor loadings of items 3 and 18. These four items were removed, resulting in a 23-item Dutch SCIM. Furthermore, alpha and omega coefficients at T1 and T2 indicated adequate reliability for consolidated identity and good to excellent reliability for disturbed identity and lack of identity. Hence, the 23-item Dutch SCIM seems to produce valid and reliable scores to assess identity in Belgian adolescents. Unlike Criterion A measures, in which only a global rating of deficits in identity, self-direction, empathy, and/or intimacy can be obtained, the SCIM seems to be a particularly useful instrument to capture adaptive and disturbed dimensions of identity in adolescents and adults.

Our findings indicated that the 23-item Dutch SCIM was longitudinally invariant across a period of one year and, hence, seems appropriate for studying identity trajectories throughout adolescence. Increased precision in the over-time measurement of identity will hopefully facilitate an improved understanding of the developmental course of identity functioning in adolescents. Additionally, researchers might be encouraged to study the directionality of effects linking identity to psychopathology. Furthermore, this study obtained partial scalar longitudinal invariance of SCIM scores across boys and girls, and across early, mid-, and late adolescents. As particularly item intercepts of the lack of identity scale could not be constrained to be equal across boys and girls, the relations between these items and the latent lack of identity factor may differ across boys and girls, suggesting that their scores on lack of identity should not be interpreted the same (Raykov et al., 2013). It is unclear why certain item intercepts were not invariant across age groups. Collectively, differences in observed SCIM scores across time points, gender, and age groups are most likely representative of differences in the latent factors, although caution is warranted when examining gender differences in lack of identity. Future research using the SCIM could explore if the reported differential item functioning across gender and age groups is consistent across samples.

Similar to previous research (Bogaerts et al., 2018), consolidated identity scores were positively associated with identity synthesis and negatively with identity confusion, whereas opposite associations were obtained for disturbed

identity and lack of identity scores. Consolidated identity and identity synthesis thus appear to be indicative of healthy identity functioning, whereas disturbed identity, lack of identity, and identity confusion seem to tap into identity difficulties. Furthermore, consolidated identity scores were positively related to openness, conscientiousness, extraversion, and agreeableness, while they were negatively related to neuroticism and borderline features at both time points. Conversely, disturbed identity and lack of identity scores were positively related to neuroticism and borderline features, while they were negatively associated with adaptive Big-Five traits. Our findings are consistent with previous research (Bastiaansen et al., 2013; Cruitt et al., 2019; Luyckx et al., 2014) and seem to indicate that healthy identity functioning is associated with adaptive personality traits, whereas identity impairment is associated with maladaptive or pathological personality traits in adolescents.

This study has the following limitations. First, study variables were assessed using self-report questionnaires. Collecting all data from a single informant might have resulted in reporting bias and inflated correlations (Podsakoff et al., 2003). Furthermore, students may have had limited insight into their traits, as personality is known to be ego-syntonic (APA, 2013). Second, questionnaires were administered in the same order to all students and, hence, order effects could not be prevented. Third, based on a validation study on the SCIM in community adults (Bogaerts et al., 2018), we decided to remove the "I don't know" option from the SCIM survey in the present study to ensure that adolescents answered each item. Although we encouraged adolescents to ask for help during the data collection process when they had difficulty understanding an item, we could not rule out that some adolescents did not understand the items and answered them without asking for help. Fourth, longitudinal measurement invariance was analyzed using two waves of data spanning 1 year. Having more time points would provide additional information about the SCIM, and allow for more complex statistical analyses. Furthermore, future research should investigate shorter time intervals, as identity seems to operate on a day-to-day basis (Becht et al., 2016). Fifth, the Dutch SCIM showed *partial* scalar longitudinal measurement invariance across gender and age groups, indicating that certain item intercepts were not invariant across groups. Future research replicating this finding could explore why these intercepts were not invariant. Sixth, our findings on longitudinal measurement invariance may not be generalizable to adults. Since the SCIM was originally developed for and is mainly administered in adults, measurement invariance of SCIM scores has to be established in adults. Similarly, our findings on associations between SCIM scores, identity formation, and personality traits may not be generalizable to clinical samples. Particularly in light of the AMPD, future research should investigate these associations in clinical samples of adolescents and adults, facilitating our understanding of the clinical utility of the SCIM.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1027/1015-5759/a000623

ESM 1. Table E1: Self-concept and identity measure items

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