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VALIDATION OF SCHEMA COPING INVENTORY AND SCHEMA MODE INVENTORY IN ADOLESCENTS

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This study investigated whether the schema therapy constructs of schema coping and schema modes have validity in adolescents. We examined the validity and reliability of the Schema Coping Inventory (SCI) and an 80-item version of the Schema Mode Inventory (SMI) in a mixed sample of adolescents. Confirmatory factor analyses showed that the first-order factor structures of the SCI and SMI were replicated, but that the hypothesized higher-order models of the SMI were not confirmed. Instead, we proposed an alternative higher-order model of Internalizing, Externalizing, Overachieving, and Healthy modes. In general, the SCI and SMI scales were able to distinguish the clinical sample from the community sample, and meaningful relationships were found between coping styles, schema modes, and behavior problems. In conclusion, our study supports the theorized relationships between schema coping styles, schema modes, and behavior problems in adolescents, and provides initial validation for the SCI and the 80-item SMI in adolescent populations.

Schema therapy (ST) is becoming increasingly popular as a treatment for children and adolescents with personality disorder features (see Loose, Graaf, & Zarbock, 2013). There is substantial evidence for the effectiveness of ST in adult patients (for an overview, see Masley, Gillanders, Simpson, & Taylor, 2012), and recent studies provide preliminary evidence that ST is also effective

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in adolescents with personality pathology combined with mood problems (Roelofs, Muris, P., van Wesemael, et al., 2016) or behavior problems (van Wijk-Herbrink, Broers, Roelofs, & Bernstein, 2016). Although the key constructs of ST (i.e., early maladaptive schemas, schema coping, and schema modes) have been well established in adults (e.g., van Vreeswijk, Broersen, & Nadort, 2012), we know little about some of these constructs in adolescents. Constructs that have been validated in adults do not necessarily apply to adolescents, or they may manifest themselves differently. For example, Rijkeboer and de Boo (2010) showed that not all maladaptive schemas that are present in adults could be validated in children. Similarly, the instruments measuring the ST constructs that were developed for adults may not be valid in adolescents. We conducted this study to investigate (a) whether the key constructs of ST have validity in a healthy and clinical adolescent sample, and (b) whether the instruments assessing these constructs have adequate psychometric properties in these samples.

The ST constructs of early maladaptive schemas, schema coping, and schema modes are embedded in the schema theory as developed by Young (Young, Klosko, & Weishaar, 2003). Early maladaptive schemas are strong, dysfunctional mental representations of oneself, other people, and the world. These maladaptive schemas are developed in (early) childhood and stem from a combination of child temperament, insufficient parental sensitivity for the child's needs, and childhood adverse experiences. They are self-perpetuating emotional and cognitive patterns that are deeply anchored, and they are reinforced by unhealthy ways of coping with these schemas. Young and colleagues (2003) defined three unhealthy coping styles in response to maladaptive schemas: Surrender (i.e., giving in to the schema), Avoidance (i.e., avoiding the painful emotions that are associated with the schema), and Overcompensation (i.e., doing the opposite of what the schema evokes). For example, when a schema of Mistrust/abuse ("Other people are always out to get me") is triggered, this could be coped with by choosing friends that are likely to mistreat you (Surrender), by avoiding relationships with other people (Avoidance), or by mistreating other people in order to be one step ahead of them (Overcompensation).

Coping responses to triggered schemas are theorized to be reflected in schema modes, which can be considered the active state of early maladaptive schemas. Although the concept of schema modes overlaps with other concepts in the literature (see, for example, Berne, 1961; Watkins & Watkins, 1997), there are certain features about schema modes that make them unique. Because they integrate both early maladaptive schemas and coping responses, schema modes comprise unique combinations of emotional, cognitive, physiological, and behavioral elements. Young and colleagues (2003) categorized schema modes into (a) dysfunctional child modes (i.e., states that are linked to the negative emotions felt in childhood), (b) dysfunctional coping modes (i.e., states that deal with activated schema modes by adopting an unhealthy coping style), (c) dysfunctional parent modes (i.e., states involving self-directed criticism or demands), and (d) healthy modes (the Healthy Adult mode, which makes healthy decisions and acts in a mature way, and the Happy Child mode, which is playful and carefree).

Research has shown support for the theorized relationships between the three key constructs of ST (i.e., early maladaptive schemas, schema coping, and schema modes), confirming that schema coping mediates the relationship between schemas and schema modes (Rijkeboer & Lobbestael, 2012). This enhances our understanding of underlying processes in patients with personality pathology, also implying that the assessment of such constructs in individuals could be valuable. Although the construct and assessment of early maladaptive schemas have been validated in adolescents (Muris, 2006; Roelofs, Lee, Ruijten, & Lobbestael, 2011; van Vlierberghe, Braet, Bosmans, Rosseel, & Bögels, 2010), the adolescent literature is scarce with respect to schema coping and schema modes. To assess schema coping, the Schema Coping Inventory (SCI) was developed by Rijkeboer and colleagues (Rijkeboer, Lobbestael, Arntz, & van Genderen, 2010). Although other measures of coping in adolescents are available in the literature (see Sveinbjornsdottir & Thorsteinsson, 2008), this instrument is unique in that it is a short measure (only 12 items) assessing the three coping styles as defined by Young and colleagues (2003), which were found to mediate the relationship between schemas ("traits") and schema modes ("states"). In two large adult samples (mainly patients), meaningful relationships were found between these coping styles and measures of various personality disorders (Rijkeboer & Lobbestael, 2016). However, the SCI has not been validated yet in an adolescent population.

For assessing schema modes, only the Schema Mode Inventory (SMI; Young et al., 2007) is available in the literature. Roelofs, Muris, & Lobbestael (2016) recently adapted the SMI into a version for adolescents (SMI-A). They found that, in a sample of healthy adolescents, the SMI-A had good factorial validity and internal consistency, and meaningful relations existed between schema modes and early maladaptive schema domains, psychopathology symptoms, and quality of life. This is the first evidence that the mode construct may be valid in adolescents.

The main aim of this study was to validate the constructs of schema coping styles and schema modes, as well as the measures developed to assess these constructs, in both a healthy and a clinical adolescent sample. Therefore, the factor structure, internal consistency, and concurrent validity of the Schema Coping Inventory and a shortened version of the Schema Mode Inventory were investigated in these samples. Rather than the adolescent version of the Schema Mode Inventory developed by Roelofs, Muris, and Lobbestael (2016), we used a shorter version of 80 items, which may have greater clinical utility. Like the SMI-A, the 80-item version was based on the SMI developed by Young and colleagues (2007). However, the 80-item version contains some items that are not in the SMI-A, as it was constructed by selecting the five items with the highest factor loadings on the 16 schema modes.

With regard to the Schema Coping Inventory, we expected to find the theorized factor structure of the three unhealthy coping styles. With regard to the Schema Mode Inventory, we expected to distinguish the same schema modes as were previously found in both adult and adolescent populations (Lobbestael, van Vreeswijk, Spinhoven, Schouten, & Arntz, 2010; Reiss et al., 2012; Roelofs, Muris, & Lobbestael, 2016). Next, we tried to find a higher-order structure of schema modes. Several higher-order structures can

be hypothesized. The most traditional one is Young's theoretical classification of dysfunctional child modes, dysfunctional coping modes, dysfunctional parent modes, and healthy modes. This four-factor model was empirically tested in an adult sample by Lobbestael and colleagues (2010), who found a reasonable fit of this model to their data, but they concluded that the first-order model was preferable. Keulen-De Vos and colleagues (in press) found another higher-order structure using the 80-item SMI in an adult forensic population. With exploratory factor analysis, they found a three-factor solution representing internalizing, externalizing, and healthy schema modes. This model is also of conceptual interest, as it is in line with the long tradition of perceiving psychopathology as being either of an internalizing or an externalizing nature (Achenbach, 1966; Krueger, 1999). Moreover, this model may enhance our understanding of the theoretical links between schema coping styles and schema modes, as we would expect an overcompensatory coping style to be related to externalizing modes, and a surrendering coping style to be related to internalizing modes. We decided to test both Young's theory-based higher-order structure and the empirically based higher-order structure of internalizing, externalizing, and healthy schema modes, since both models are conceptually meaningful, and so far, both lack sufficient empirical support. With regard to schema coping styles and dysfunctional schema modes, we expected higher scores on these constructs in the clinical sample than in the community sample. Since our clinical sample consisted of adolescents who were in treatment for externalizing behavior problems, we expected higher scores for the clinical sample specifically on overcompensatory coping and on schema modes with an externalizing component (e.g., Enraged Child mode or Bully and Attack mode). Scores on healthy schema modes (Healthy Adolescent and Happy Child) were expected to be higher in the community sample than in the clinical sample.

A final aim of this study was to examine the relationships between schema coping styles, schema modes, and problem behaviors in a first attempt to determine the concurrent validity of these instruments when used in an adolescent population. We hypothesized that associations between these measures exist, because schema coping styles can be a component of schema modes, and because problem behaviors can be inherent to certain schema modes (e.g., externalizing behaviors in a Bully and Attack mode).

METHOD

PARTICIPANTS AND PROCEDURE

This study is based on a community sample (n = 577) and a clinical sample (n = 122). Participants in the community sample were recruited from a secondary school in the Netherlands, and participants from the clinical sample were recruited from two residential settings with open and secure treatment groups for adolescents with severe behavior problems. The total sample consisted of 702 adolescents, of which three (all from the clinical sample) were removed from the database due to excessive missing values (> 10%) on both the SCI and SMI. The community sample comprised 242 male and 335 female

adolescents. Their age varied from 11 to 18 years old (M = 14.4 years, SD = 1.7). The vast majority was Dutch (566 adolescents; 98%), two were from Germany, two were from Turkey, and five were of other origins (from Italy, Armenia, Romania, Iran, and Morocco).

Of the 122 adolescents in the clinical sample, 70 were male and 52 were female. They were between 12 and 18 years old (M = 15.5, SD = 1.2). The majority of them was Dutch (102 adolescents; 84%), four were Moroccan (3%), three were from the Dutch Antilles (2%), two were from Turkey (2%), two were from Suriname (2%), two were from Italy (2%), five were of other origins (from Spain, Syria, Iraq, Iran, and Yugoslavia; 5%), and two did not specify their origin (2%).

A total of 66.6% of the adolescents in the clinical sample had a chart diagnosis of *Diagnostic and Statistical Manual of Mental Disorders,* fourth edition (*DSM-IV*; American Psychiatric Association, 2000), Disruptive Behavior Disorders (20.6% Conduct Disorder, 28.4% Oppositional-Defiant Disorder, and 17.6% Behavior Disorder Not Otherwise Specified). Also, 57.7% of the charts specified personality pathology or emerging Personality Disorders. Other prevalent chart diagnoses were Substance Abuse Disorder (31.4%), Attention Deficit and Hyperactivity Disorder (25.5%), Autism Spectrum Disorder (18.6%), Post-Traumatic Stress Disorder (17.6%), Reactive Attachment Disorder (16.7%), and Mood Disorders (13.7%: 5.9% Depressive Disorder, 5.9% Dysthymic Disorder, and 2.0% Depressive Disorder Not Otherwise Specified). Rare chart diagnoses included Social Anxiety Disorder, Specific Phobia, Eating Disorder Not Otherwise Specified, and Tourette Syndrome (all < 1%). The charts also specified intellectual abilities either by an IQ-score or by a qualitative description. In general, the intellectual abilities of the adolescents in the clinical sample were average or just below average, and only three patients were reported to have an IQ well below average (IQ scores between 70 and 80).

All participants from the community sample gave written informed consent to complete questionnaires about early maladaptive schemas, schema coping, schema modes, and behavior problems. At the residential facilities, the same questionnaires were filled out by the adolescents for clinical purposes, and were generated from patient files (the anonymous use of these data for research purposes was part of the written consent for clinical treatment). This procedure was approved by the Ethics Committee of Maastricht University in the Netherlands.

INSTRUMENTS

Schema Coping. Schema coping was measured by the Schema Coping Inventory (SCI; Rijkeboer et al., 2010). The SCI consists of 12 items that are intended to measure the three unhealthy coping styles: Surrender (e.g., "In case of difficulty, I tend to give up"), Avoidance (e.g., "It is best to switch off your feelings as much as possible"), and Overcompensation (e.g., "I tend to overrule and control others"). The psychometric properties of the SCI have been studied by Rijkeboer and Lobbestael (2016). In order to cross-validate their findings, they determined the factor structure of the SCI in two large adult

samples, which consisted mainly of patients. Confirmatory factor analyses yielded the best fit for a three-factor solution containing four items each. Reliability estimates of the scales were good, with Cronbach's alpha ranging from .75 to .86. Moreover, regression analyses revealed meaningful relationships between the coping scales and scales of the Assessment of DSM-IV Personality Disorders Questionnaire (ADP-IV; Schotte et al., 2004).

Schema Modes. For the assessment of schema modes, we used the 80-item version of the SMI (Young et al., 2007) and adapted the wording of nine items to make them more comprehensible for adolescents. The 80-item version of the SMI covers 16 schema modes: Lonely Child, Abandoned and Abused Child, Angry Child, Enraged Child, Impulsive Child, Undisciplined Child, Happy Child, Compliant Surrenderer, Detached Protector, Detached Self-soother, Self-Aggrandizer, Overcontroller, Bully and Attack, Punitive Parent, Demanding Parent, and Healthy Adult. Keulen-de Vos and colleagues (in press) reported good to adequate internal consistency for the scales of the 80-item version in a forensic adult population (Cronbach's alpha: .69–.90).

Problem Behaviors. Problem behaviors were assessed through the Youth Self-Report Questionnaire (YSR). The YSR is used worldwide as a self-report questionnaire for 11 to 18 year olds, and it has shown to be a reliable and valid instrument for rating emotional and behavioral problems (Achenbach & Rescorla, 2001).

RESULTS

SCHEMA COPING INVENTORY (SCI)

Factor Structure of SCI. The hypothesized three-factor structure of the SCI was tested with multisample confirmatory factor analysis (LISREL 9.1; Jöreskog & Sörbom, 2006). A nested hierarchy of hypotheses about the measurement invariance across the two samples was tested (configural, metric, strong, and strict factorial invariance) to investigate whether the hypothesized three-factor structure was present in both samples and whether mean factor scales can be meaningfully compared between the samples (Gregorich, 2006). For all models, correlations between error variances of the items were fixed to zero, but the three factors representing the three coping styles were allowed to correlate. Since the chi-square statistic has severe limitations when used in a large sample size (Hu & Bentler, 1999), the goodness of fit was evaluated by the root mean square error of approximation (RMSEA), the non-normed fit index (NNFI), the comparative fit index (CFI), and the standardized root mean square residual (SRMR). Hu and Bentler (1999) proposed that RMSEA and SRMR values below 0.05 are indicative of good fit and values below 0.08 are acceptable. The other fit statistics should be greater than 0.90. Results of the hierarchical multisample analyses on the SCI are displayed in Table 1.

The fit statistics for the models of configural, metric, and strong invariance were generally good to acceptable, suggesting that in both samples three factors were present, that these factors were associated with identical item sets

TABLE 1. Goodness-of-Fit Statistics of Hierarchical Multisample Confirmatory Factor Analyses on the Invariance of Psychometric Properties of the Schema Coping Inventory Across the Community and Clinical Sample

Fit statistic	Configural invariance	Metric invariance	Strong invariance	Strict invariance
X^2	213.71	254.48	345.74	444.91
df	102	114	126	138
RMSEA (90% CI)	0.056	0.059	0.069	0.080
90% CI	0.046, 0.067	0.050, 0.069	0.061, 0.078	0.072, 0.088
NNFI	0.95	0.94	0.92	0.90
CFI	0.96	0.95	0.93	0.90
SRMR				
Community	0.044	0.058	0.059	0.077
Clinical	0.058	0.229	0.233	0.340

RMSEA = root mean square error of approximation; CI = confidence interval; NNFI = non-normed fit index; CFI = comparative fit index; SRMR = standardized root mean square residual.

across the samples, and that the factor means can be meaningfully compared between the samples. For strict factorial invariance, the fit statistics generally were on the threshold of acceptable values, providing only dubious evidence for equality of residual variances across the two samples. In the models of metric, strong, and strict invariance, SRMR values in the clinical sample deviated from the other fit statistics in that they suggested poor fit. However, the contribution of the clinical group to the chi-square values for these models was relatively large (varying from 39.8% to 53.6%) considering its relatively small contribution to the total sample size (21.1%). So while the parameter estimates were predominantly guided by the community sample (because it contains more participants and therefore more information), most discrepancies were within the clinical sample, pushing up the SRMR for this sample. Although all fit statistics deteriorate slightly as the model gets more stringent, there is some evidence for the hierarchical models up to the level of strong factorial invariance. This would suggest that (a) the SCI has the same factor structure in adolescents as was previously found in adults, and (b) meaningful comparisons can be made between the factor means of the community and clinical adolescent samples. The internal consistency of the three SCI scales was considerably higher for the clinical sample than for the community sample, with Cronbach's alphas ranging from .61 to .67 for the community sample and from .71 to .78 for the clinical sample.

Sample Differences on SCI Scales. A MANOVA was conducted to test for differences in mean scores on the SCI scales between the community and clinical sample (i.e., group effect). Gender was taken into account as a possible moderating variable. The multivariate test showed a significant group effect, $F(3, 693) = 11.24$, $p < .001$, and a significant interaction between group and gender, $F(3, 693) = 11.30$, $p < .001$. See Table 2 for the descriptive statistics, univariate test results, and effect sizes. Effect sizes were presented only for significant univariate tests by calculating Cohen's *d*.

TABLE 2. Descriptive Statistics of the Schema Coping Inventory (SCI) Scales and Results of Univariate *F* Tests on the Effects of Population on the SCI Scales

Scale SCI	Gender	Community sample M (*SD*)	Clinical sample M (*SD*)	*F*	*p*	Cohen's *d*
SU	Boys	2.54 (1.01)	2.57 (1.38)			
	Girls	2.73 (1.04)	3.17 (1.57)			
	Total	2.65 (1.03)	2.83 (1.49)	4.32	.038	0.16
AV	Boys	2.82 (1.01)	2.97 (1.37)	0.98	.323	
	Girls	2.80 (1.07)	3.91 (1.46)	43.92	< .001	0.99
	Total	2.81 (1.05)	3.37 (1.48)	31.45	< .001	0.50
OC	Boys	3.66 (1.58)	3.13 (1.45)	10.20	.002	–0.43
	Girls	3.29 (1.10)	3.85 (1.35)	11.08	.001	0.50
	Total	3.44 (1.14)	3.44 (1.45)	0.02	.891	

Note. Univariate *F* tests on the effects of population on the scales are only reported for boys and girls separately when the interaction effect between population and gender reached statistical significance. SU = surrender; AV = avoidance; OV = overcompensation.

The univariate tests showed a significant but very small effect of group on Surrender (d = 0.16), with no significant interaction between group and gender, $F(1, 695) = 3.28$, $p = .070$. Adolescents in the clinical sample scored somewhat higher on Surrender than adolescents in the community sample. A moderate effect of group was found on the subscale Avoidance (d = 0.50), with a significant interaction between gender and group, $F(1, 695) = 18.43$, $p < .001$. This interaction effect showed that differences between the clinical and community sample were large for girls (girls in the clinical sample scored higher on Avoidance than girls in the community sample, d = 0.99), but nonexistent for boys. The effect of group on Overcompensation failed to reach significance, but there was a significant interaction effect between group and gender on this subscale, $F(1, 695) = 21.31$, $p < .001$. Whereas girls in the clinical sample scored moderately higher on Overcompensation than girls in the community sample (d = 0.50), the reverse pattern was found for boys: Unexpectedly, boys in the clinical sample scored moderately lower on Overcompensation than boys in the community sample (d = –0.43).

SCHEMA MODE INVENTORY (SMI)

Factor Structure of SMI. For the first-order model of SMI, we first tested the original structure of the SMI with 16 subscales using LISREL confirmatory factor analysis, allowing the subscales to correlate. Correlations between error variances of the items were fixed to zero. The ratio of items to participants forced us to test this on the whole sample instead of using multisample analysis, and even then, we had to create item parcels for each participant. Two item parcels were made within each of the hypothesized factors (schema modes), so respectively two and three items were averaged to represent the item parcels of the schema modes.

The goodness-of-fit statistics for the first-order model are displayed in the second column of Table 3 and were generally indicative of a good-to-acceptable

TABLE 3. Goodness-of-Fit Statistics of First-Order and Higher-Order Confirmatory Factor Analyses Performed on the Schema Mode Inventory

Fit statistic	1st order: 16 scales	2nd order: Model Young	2nd order: Model Keulen-de Vo	2nd order: Model EFA	2nd order: Adapted model
X^2	1024.970	2157.97	1321.31	600.73	372.43
df	344	98	101	97	87
RMSEA	0.053	0.174	0.132	0.122	0.098
90% CI	0.050, 0.057	0.167, 0.180	0.125, 0.138	0.112, 0.131	0.088, 0.108
NNFI	0.95	0.75	0.86	0.88	0.92
CFI	0.96	0.79	0.88	0.90	0.94
SRMR	0.037	0.095	0.080	0.074	0.056

Model EFA = model resulting from the exploratory factor analysis; CI = confidence interval; RMSEA = root mean square error of approximation; NNFI = non-normed fit index; CFI = comparative fit index; SRMR = standardized root mean square residual.

fit. So overall, the schema modes found in previous studies in both adults and adolescents were replicated with the shortened SMI in our mixed adolescent sample. Internal consistency for the subscales (based on SMI items, not on parcels) was excellent to adequate, with a mean Cronbach's alpha of 0.82 (ranging from 0.67 to 0.93; median 0.82).

Both hypothesized higher-order models were tested with LISREL confirmatory factor analysis. The results displayed in the third and fourth columns of Table 3 indicated poor fit of both models to our data. The conceptual model of Young (2003), with the four factors of dysfunctional child modes, dysfunctional parent modes, dysfunctional coping modes, and healthy modes, showed the poorest fit (e.g., RMSEA = 0.174). The model found previously by Keulen-de Vos (in press) also failed to generate acceptable fit statistics (e.g., RMSEA = 0.132).

We therefore decided to randomly split the sample in half and to perform an exploratory factor analysis on the first half (n = 347) using SPSS version 20, and to use the second half for replication with LISREL confirmatory factor analysis. The exploratory factor analysis on the first half of our sample was conducted using the principal axis factoring method with oblique rotation. To determine the optimal number of factors to retain, highly accurate approaches such as parallel analysis[1] and the minimum average partial (MAP) test[2] should be favored over more arbitrary rules, such as Kaiser's criterion (retain factors with eigenvalues > 1) and inspection of the scree plot (Hayton,

1. In parallel analysis, the factor variances of the original dataset are compared to variances of factors derived from random data. Factors are retained as long as the variation they explain is higher than their (average or 95th percentile) parallel factor variances from random data (Cota, Longman, Holden, Fekken, & Xinaris, 1993; Horn, 1956). We used the SPSS syntax provided by O'Connor at https://people.ok.ubc.ca/brioconn/nfactors/nfactors.html.

2. Velicer's (1976) MAP test involves a principal component analysis, and then computes average squared partial correlations after each component is partialled out. No further components are extracted once the minimum average squared partial correlation is reached. We used the SPSS syntax provided by O'Connor at https://people.ok.ubc.ca/brioconn/nfactors/nfactors.html.

Allen, & Scarpello, 2004; O'Connor, 2000). However, in our case the parallel test and MAP test did not converge. Table 4 shows that the parallel analysis suggested to retain four factors, whereas the MAP test suggested to retain three factors. Examination of the eigenvalues and scree plot showed that Kaiser's criterion suggested a three-factor model, and the scree plot could result in the decision to retain either three or four factors. Since Hayton and colleagues (2004) recommended including theory in the factor-retention approach, we decided to inspect both the three- and four-factor models, and to let theory and interpretability of the models guide our final decision.

The three-factor solution most closely resembled the proposed model by Keulen-de Vos and colleagues (in press) of internalizing, externalizing, and healthy modes. Nonetheless, there were two deviations from this model. Instead of loading on the externalizing factor, both the Overcontroller and the Self-Aggrandizer mode loaded on the factor that included the hypothesized internalizing modes. This seems counterintuitive, especially for the Self-Aggrandizer mode that represents a state in which one feels and acts superior to others.

In the four-factor model, these two modes (and the Demanding Parent mode) loaded on an additional factor, which we interpreted as Overachieving modes (see Table 5). In our opinion, this model was conceptually more meaningful than the three-factor model, as it did not contain any paradoxical factor loadings. Moreover, the additional factor of Overachieving modes makes sense from a developmental perspective, as adolescents are striving to meet societal demands and pursue dreams and goals for the future. We therefore continued our analyses with the four-factor model.

In this model, only the Self-Soother mode did not have a unique loading above .40 (which was used as a cut-off point in reporting the factor loadings in Table 5) on any of these factors. Instead, it showed weak loadings on both the internalizing and the externalizing factor. Because of the integration of both self-soothing and self-stimulating behavioral tendencies in the Self-Soother mode, this is not surprising, and we decided to allow for a double loading of the Self-Soother mode in the confirmatory factor analysis.

TABLE 4. Eigenvalues of Original Dataset as Compared to Parallel Analysis Eigenvalues, and MAP Test Average Partial Correlations to Determine Factor Retention

	Original dataset Eigenvalues		Parallel analysis[a] Eigenvalues		MAP test Average partial correlations	
Root	Total variance	Common variance	Means	95th percentile	Squared	Power4
1	9.333	9.054	0.439	0.533	0.059	0.009
2	1.761	1.463	0.351	0.418	0.047	0.006
3	**1.208**	0.896	0.285	0.344	**0.033**	**0.003**
4	0.606	0.289	**0.229**	**0.279**	0.035	0.007
5	0.485	0.155	0.178	0.222	0.040	0.012
6	0.375	0.094	0.133	0.172	0.049	0.015

MAP = minimum average partial. [a]Parallel analysis was conducted on 1,000 permutations of the original dataset.

TABLE 5. Schema Mode Factor Loadings on Higher-Order Factors Based on Exploratory Factor Analysis

Factor	Factor loading
Factor 1: Internalizing modes (eigenvalue = 9.3)	
Abandoned Child	0.88
Lonely Child	0.84
Punitive Parent	0.83
Compliant Surrenderer	0.68
Detached Protector	0.57
Factor 2: Healthy modes (eigenvalue = 1.8)	
Happy Child	1.01
Healthy Adolescent	0.75
Factor 3: Externalizing modes (eigenvalue = 1.2)	
Enraged Child	0.99
Impulsive Child	0.68
Bully and Attack	0.56
Undisciplined Child	0.55
Angry Child	0.54
Factor 4: Overachieving modes (eigenvalue = 0.6)	
Self-Aggrandizer	0.74
Demanding Parent	0.63
Overcontroller	0.45

Note. Only factor loadings above .40 are reported.

A confirmatory factor analysis was conducted on the second half of our sample (n = 352) to investigate whether the four-factor solution would be maintained. The goodness-of-fit statistics are provided in Table 3 (column Model EFA) and generally did not demonstrate a good fit, especially because of an unacceptably high RMSEA value (0.122). We decided to explore this model further by looking at the modification indices. When conceptually defensible, adaptations were made to the model. Statistically, the modification indices showed that the strongest improvement of the model could be made by allowing the Angry Child mode (belonging to the externalizing modes) to also load on the internalizing factor. Conceptually, the anger in the Angry Child mode (unlike the Enraged Child Mode) refers to angry feelings inside about unfulfilled needs rather than angry outbursts (i.e., "anger-in" versus "anger-out"; Spielberger, 1991). It is also linked to subjective rejection by another person in one item, so taken together we decided that the double loading was justified. Other modifications comprised allowing for correlated errors between some modes that are conceptually similar or related, such as the Abandoned Child and Lonely Child, Angry Child and Enraged Child, Impulsive Child and Enraged Child, Angry Child and Undisciplined Child, Self-Aggrandizer and Demanding Parent, Punitive Parent and Abandoned Child, and Punitive Parent and Lonely Child.

In total, nine modifications were made, resulting in the goodness-of-fit statistics displayed in the final column of Table 3. Although the RMSEA was still higher than desirable, the other fit statistics were acceptable for this adapted model. Internal consistencies of the four factors were excellent to good, with Cronbach's alphas (calculated on the data of the second half of our sample) of 0.87 for Healthy modes, 0.95 for Internalizing modes, 0.92 for Externalizing modes, and 0.82 for Overachieving modes.

Sample Differences on SMI Scales. To test for differences on the SMI between the clinical and the community sample, a MANOVA was conducted, with gender as a second independent variable and the four higher-order factors and separate schema modes as dependent variables. The multivariate test showed a significant group effect, $F(16, 679) = 25.92$, $p < .001$, and a significant interaction of group and gender, $F(16, 679) = 3.57$, $p < .001$. Descriptive statistics, univariate test results, and effect sizes are reported in Table 6. Cohen's *d* was calculated only for significant univariate tests as an indicator of the effect size. Interaction effects of group and gender are displayed in Table 7.

TABLE 6. Descriptive Statistics of Schema Mode Inventory (SMI) Subscales and Higher-Order Scales

SMI Subscale/Higher-Order Scale		Community sample *M* (*SD*)	Clinical sample *M* (*SD*)	*F*	*d*
Detached Self-Soother	Boys	2.05 (0.93)	2.36 (1.31)	5.07*	–0.27
	Girls	2.13 (0.97)	3.23 (1.13)	55.44**	–1.04
	Total	2.09 (0.95)	2.73 (1.30)	48.50**	–0.56
Internalizing modes	Boys	1.71 (0.66)	2.13 (1.16)	14.97**	–0.44
	Girls	1.82 (0.71)	2.74 (1.05)	66.06**	–1.03
	Total	1.77 (0.69)	2.39 (1.15)	73.15**	-0.65
Abandoned Child	Boys	1.49 (0.78)	1.95 (1.30)	—	—
	Girls	1.60 (0.78)	2.35 (1.26)	—	—
	Total	1.56 (0.78)	2.12 (1.29)	45.10**	–0.52
Lonely Child	Boys	1.66 (0.74)	2.11 (1.28)	13.85**	–0.43
	Girls	1.93 (0.87)	2.79 (1.30)	37.20**	–0.78
	Total	1.82 (0.83)	2.40 (1.33)	49.65**	–0.52
Punitive Parent	Boys	1.61 (0.72)	2.04 (1.24)	13.50**	–0.42
	Girls	1.75 (0.77)	2.63 (1.31)	47.61**	–0.82
	Total	1.69 (0.75)	2.29 (1.30)	57.32**	–0.57
Compliant Surrenderer	Boys	1.87 (0.77)	2.10 (1.18)	3.67	—
	Girls	1.95 (0.73)	2.62 (0.99)	33.64**	–0.77
	Total	1.91 (0.75)	2.32 (1.13)	29.29**	–0.43
Detached Protector	Boys	1.58 (0.67)	2.22 (1.35)	29.78**	–0.60
	Girls	1.55 (0.74)	2.85 (1.26)	111.92**	–1.26
	Total	1.56 (0.71)	2.49 (135)	130.54**	–0.86

Continued

SMI Subscale/Higher-Order Scale		Community sample *M* (*SD*)	Clinical sample *M* (*SD*)	*F*	*d*
Externalizing modes	Boys	2.27 (0.78)	3.01 (1.27)	36.00**	–0.71
	Girls	2.16 (0.71)	3.68 (1.21)	166.02**	–1.54
	Total	2.21 (0.74)	3.30 (1.28)	175.46**	–1.04
Enraged Child	Boys	1.68 (0.88)	2.71 (1.45)	53.91**	–0.86
	Girls	1.45 (0.67)	3.03 (1.54)	160.37**	–1.33
	Total	1.55 (0.77)	2.85 (1.49)	194.21**	–1.10
Impulsive Child	Boys	1.96 (0.81)	2.47 (1.30)	15.99**	–0.47
	Girls	1.87 (0.79)	3.22 (1.23)	109.32**	–1.31
	Total	1.91 (0.80)	2.79 (1.32)	104.72**	–0.81
Bully and Attack	Boys	1.69 (0.66)	2.16 (0.95)	22.01**	–0.57
	Girls	1.46 (0.55)	2.44 (0.99)	109.62**	–1.22
	Total	1.56 (0.61)	2.28 (0.97)	112.04**	–0.89
Undisciplined Child	Boys	2.19 (0.81)	2.57 (1.19)	9.47*	–0.37
	Girls	2.07 (0.73)	3.11 (1.17)	74.54**	–1.07
	Total	2.12 (0.77)	2.80 (1.21)	67.67**	–0.67
Angry Child	Boys	1.75 (0.75)	2.77 (1.37)	65.91**	–0.92
	Girls	1.82 (0.77)	3.40 (1.34)	148.86**	–1.45
	Total	1.79 (0.76)	3.04 (1.39)	207.84**	–1.12
Overachieving modes	Boys	2.27 (0.78)	2.29 (0.97)	0.20	—
	Girls	2.19 (0.68)	3.01 (0.98)	56.50**	–0.97
	Total	2.22 (0.70)	2.60 (1.03)	31.52**	–0.43
Self-Aggrandizer	Boys	2.26 (0.92)	2.16 (1.02)	0.62	—
	Girls	2.03 (0.76)	2.77 (1.18)	36.01**	–0.75
	Total	2.13 (0.83)	2.42 (1.13)	12.99**	–0.29
Demanding Parent	Boys	2.30 (0.85)	2.29 (1.20)	0.01	—
	Girls	2.46 (0.95)	3.04 (1.27)	15.19**	–0.52
	Total	2.39 (0.91)	2.61 (1.28)	8.46**	–0.20
Overcontroller	Boys	2.21 (0.78)	2.43 (1.01)	3.73	—
	Girls	2.09 (0.76)	3.22 (1.02)	89.11**	–1.26
	Total	2.14 (0.77)	2.76 (1.08)	66.88**	–0.66
Healthy modes	Boys	4.55 (0.92)	3.43 (1.31)	—	—
	Girls	4.43 (0.88)	3.56 (1.01)	—	—
	Total	4.48 (0.90)	3.49 (1.19)	106.97**	0.94
Happy Child	Boys	4.46 (1.00)	3.17 (1.27)	—	—
	Girls	4.37 (0.95)	3.28 (1.00)	—	—
	Total	4.41 (0.97)	3.22 (1.16)	136.37**	1.11
Healthy Adolescent	Boys	4.65 (0.97)	3.69 (1.45)	—	—
	Girls	4.48 (0.92)	3.83 (1.16)	—	—
	Total	4.55 (0.94)	3.75 (1.33)	61.27**	0.69

Note. Univariate *F* tests on the effects of population on the scales were reported for boys and girls separately only when the interaction effect between population and gender reached statistical significance. *$p < 0.05$. **$p < 0.001$.

TABLE 7. Interaction Effects of Group and Gender on Schema Modes and Higher-Order Factors

	Group × Gender	
Schema Mode Inventory Mode/Higher-Order Factor	*F*	*p*
Detached Self-Soother	15.00	< .001
Internalizing modes	10.28	.001
Abandoned Child	2.46	.117
Lonely Child	4.80	.029
Punitive Parent	6.82	.009
Compliant Surrenderer	7.04	.008
Detached Protector	15.12	< .001
Externalizing modes	20.66	< .001
Enraged Child	8.79	.003
Impulsive Child	20.97	< .001
Bully and Attack	13.78	< .001
Undisciplined Child	14.45	< .001
Angry Child	9.61	.002
Overachieving modes	26.33	< .001
Self-Aggrandizer	22.42	< .001
Demanding Parent	9.00	.003
Overcontroller	30.44	< .001
Healthy modes	1.67	.196
Happy Child	0.86	.353
Healthy Adolescent	2.27	.133

Compared to the community sample, adolescents in the clinical sample scored significantly lower on the Happy Child and Healthy Adolescent modes, and significantly higher on all other modes. Effect sizes were medium to large (d = –0.52 to –1.12), except for small effect sizes for the Compliant Surrenderer (d = –0.43), Self-Aggrandizer (d = –0.29), and Demanding Parent (d = –0.20) modes. Significant interaction effects between group and gender were found for all modes but the Abandoned Child, Happy Child, and Healthy Adolescent modes. In general, effect sizes were larger for girls than for boys, and for some modes (Self-Aggrandizer mode, Demanding Parent mode, Overcontroller mode), the effect of group failed to reach significance for boys. These modes were part of the higher-order domain of Overachieving modes, on which indeed no significant group effect was found for boys, whereas the effect was large (d = –0.97) for girls. The effect of group on Internalizing modes was small for boys (d = –0.44) and large for girls (d = –1.03). The effect on Externalizing modes was moderate for boys (d = –0.71) and very large for girls (d = –1.54). Finally, the effect of group on Healthy modes was large (d = 0.94) and independent of gender.

CONCURRENT VALIDITY OF SCI AND SMI WITH EACH OTHER AND WITH THE YSR

To investigate concurrent validity, bivariate correlations were calculated between the scales of the SCI, the subscales and higher-order scales of the SMI, and the YSR scales Internalizing and Externalizing behavior problems to investigate concurrent validity. Because of considerable correlations between the subscales within each instrument, possibly distorting the bivariate correlations, we also calculated partial correlations between SCI scales, SMI higher-order scales, and YSR scales (not SMI subscales because the large number of variables to control for could lead to obscure results). For example, when calculating the partial correlation between Surrender (SCI) and Internalizing behavior (YSR), we controlled for the other scales of the SCI (Avoidance, Overcompensation), as well as the remaining scale of the YSR (Externalizing behavior). All correlations are displayed in Table 8.

TABLE 8. Bivariate (and Partial) Correlations Between Schema Coping Inventory (SCI) Scales, Schema Mode Inventory (SMI) Subscales and Higher-Order Scales, and Youth Self-Report Questionnaire (YSR) Scales

Scale	SCI SU	SCI AV	SCI OV	YSR INT	YSR EXT
Detached Self-Soother	.50	.44	.38	.65	.55
Angry Child	.47	.41	.37	.67	.68
SMI INT	.66 (.37)	.54 (.16)	.35 (–.18)	.83 (.56)	.57 (–.19)
Lonely Child	.62	.48	.26	.77	.45
Punitive Parent	.61	.46	.30	.77	.53
Compliant Surrenderer	.66	.50	.37	.75	.46
Detached Protector	.52	.53	.28	.74	.46
Abandoned Child	.61	.46	.27	.76	.46
SMI EXT	.47 (–.16)	.43 (ns)	.46 (.19)	.64 (–.17)	.78 (.65)
Enraged Child	.22	.22	.30	.37	.71
Impulsive Child	.38	.34	.43	.49	.66
Bully and Attack	.29	.33	.42	.41	.69
Undisciplined Child	.49	.40	.39	.60	.64
SMI OVE	.56 (ns)	.47 (ns)	.60 (.42)	.66 (.18)	.53 (ns)
Self-Aggrandizer	.34	.28	.64	.40	.48
Demanding Parent	.55	.41	.45	.65	.36
Overcontroller	.54	.52	.44	.62	.51
SMI HEA	–.33 (ns)	–.25 (ns)	–(.13)	–.52 (–.11)	–.35 (ns)
Happy Child	–.31	–.24	–.05	–.50	–.40
Healthy Adolescent	–.32	–.24	.03	–.48	–.27
YSR INT	.62 (.51)	.44 (.10)	.29 (ns)		
YSR EXT	.26 (–.21)	.28 (ns)	.32 (.24)		

Note. Correlations significant at the 0.001 level are displayed, and nonsignificant correlations are indicated by (ns); nonsignificant correlations ranged from –.07 to .09. Partial correlations are displayed in brackets. Partial correlations are not calculated for the separate modes of the SMI because the large amount of variables to be controlled for may lead to uninterpretable results. Displayed partial correlations of each scale/domain are controlled for other scales of the same instrument (e.g., surrendering coping controls for avoidant and overcompensatory coping).
SCI SU = surrender; SCI AV = avoidance; SCI OV = overcompensation; SMI INT = internalizing mode; SMI EXT = externalizing mode; SMI OVE = overachieving mode; SMI HEA = healthy mode; YSR INT = internalizing behavior problem; YSR EXT = externalizing behavior problem.

Schema Coping and Schema Modes. Overall, bivariate correlations showed positive relationships between dysfunctional coping styles and dysfunctional schema modes, and negative relationships between dysfunctional coping styles and healthy schema modes. Strongest relationships were found between Surrender and Internalizing modes, and between Overcompensation and Overachieving modes. Other statistically significant correlations were found between Overcompensation and Externalizing modes, and between Avoidance and Internalizing modes. The relevance of the partial correlations becomes clear when interpreting the other correlations between the SCI and SMI subscales. For example, although the bivariate correlation counterintuitively suggested a significant positive relationship between Surrender and Externalizing modes (r = .47), the partial correlation showed that, in fact, the unique variance of Surrender (controlled for Avoidance and Overcompensation) contributed negatively to the unique variance of Externalizing modes (controlled for Internalizing, Overachieving, and Healthy modes) (partial r = –.16). The same pattern occurred in the relationship between Overcompensation and Internalizing modes. For other relationships, the bivariate correlation coefficients suggested a significant relationship, whereas the partial correlation coefficient revealed none (e.g., between Surrender and Overachieving modes). On the contrary, the relationship between Overcompensation and Healthy modes unexpectedly turned statistically significant (yet weak) when controlling for the remaining coping styles and dysfunctional schema modes.

Schema Coping and Behavior Problems. We found a relatively large correlation between Surrender and Internalizing behavior problems, even after controlling for the other scales of the SCI and YSR. Other positive associations were found between Overcompensation and Externalizing behavior, and between Avoidance and Internalizing behavior. Although again, based on the bivariate correlations, some other positive relationships appeared to exist between certain scales, partial correlations showed that there was no correlation between their unique variances (i.e., between Avoidance and Externalizing behavior), or this correlation was in fact negative (i.e., between Surrender and Externalizing behavior).

Schema Modes and Behavior Problems. Bivariate correlations of individual schema modes from the Internalizing modes domain were generally larger with Internalizing behavior than with Externalizing behavior. Similarly, a relatively large positive correlation was found between (the unique variances of) Internalizing modes and Internalizing behavior, whereas the unique variances of Internalizing modes and Externalizing behavior problems turned out to be negatively correlated. The reverse pattern was found for the relationships between Externalizing modes, on the one hand, and Internalizing and Externalizing behavior problems on the other. The two modes loading on both the Internalizing and Externalizing modes scales (Detached Self-Soother and Angry Child) showed moderately positive bivariate correlations with both Internalizing and Externalizing behavior problems. There were also moderately positive bivariate correlations between modes belonging to the Overachieving modes scale, and Internalizing and Externalizing behavior problems, but when controlled for

other scales, only the correlation between Overachieving modes and Internalizing behavior, not Externalizing behavior, was significantly positive yet weak. Individual healthy schema modes correlated negatively with both Internalizing and Externalizing behavior problems, although overall, the unique variance of Healthy modes seemed to be weakly and negatively associated with the unique variance of Internalizing behavior, not Externalizing behavior.

DISCUSSION

This is the first study to provide evidence for the validity and reliability of the SCI and the 80-item version of the SMI in an adolescent population. We found support for the three-factor structure of the SCI in both a community and a clinical adolescent sample by replicating the three coping styles of Surrender, Avoidance, and Overcompensation, which have been previously found in adults. Also, the 16 schema modes of the SMI were replicated in our adolescent sample confirming adult findings. Although hypothesized higher-order models of schema modes were not found, we did find some evidence for an alternative higher-order model of Internalizing, Externalizing, Overachieving, and Healthy modes. With some exceptions, the SCI and SMI scales were able to distinguish between the community and the clinical adolescent samples, and meaningful relationships were found between coping styles, schema modes, and behavior problems. These findings provide initial support for the validity of these constructs and use of the questionnaires in adolescents.

Some caveats to this study should be discussed. For example, although the three coping styles Surrender, Avoidance, and Overcompensation were replicated in both the clinical and community sample, the hierarchical tests of measurement invariance were not unequivocally interpretable. The literature provides some guidance in how to determine whether the next model in the hierarchy should be valued as a good fit. For example, Gregorich (2006) has proposed the use of a chi-square difference test, and others have suggested that the decrease in CFI should not exceed 0.01 (Wu, Li, & Zumbo, 2007). However, just like the chi-square test, the chi-square difference test is very sensitive to sample size (Wu et al., 2007), and the CFI criterion is arbitrary. Inspection of the fit statistics of each model separately suggests that there is at least some evidence for the hierarchical models up to the strong invariance model. These findings should be replicated in community and clinical samples that are more equal in sample size.

Internal reliabilities of the SCI scales were lower in our study than in the adult sample of Rijkeboer and Lobbestael (2016). When the internal reliabilities were calculated for the samples independently, we found larger reliabilities for the scales in the clinical sample than in the community sample. Post-hoc inspection of the inter-item correlations and variances in both samples revealed that the community sample generally showed less variance on the item scores than the clinical sample, which will suppress inter-item correlations and therefore Cronbach's alphas in the community sample.

Internal reliabilities of the SMI subscales were comparable to the ones found previously in adults and adolescents (Lobbestael et al., 2010; Roelofs,

Muris, & Lobbestael, 2016). Although higher-order models of schema modes may have clinical utility, they have rarely been tested. The four-factor model as developed by Young is based on theoretical and clinical considerations, but it showed poor fit to our data. It should be noted, however, that the grouping of modes in the four sets in this model has a conceptual meaning rather than that it proposes high within-group and low between-group correlations. For example, there is no theoretical necessity that Child modes should be highly correlated, and the same holds for Coping modes. Thus, the fact that there is a functional similarity between such modes in the ST model has a theoretical meaning, not necessarily implying high co-occurrence.

The alternative model of Internalizing, Externalizing, and Healthy modes also showed poor fit, but subsequent exploratory factor analysis suggested that, in our data, these factors could be supplemented with a fourth factor of Overachieving modes. Although the confirmatory factor analysis of this four-factor model produced a somewhat disappointing RMSEA value, the other fit statistics were good, and moreover, this model makes conceptual and theoretical sense. It includes the distinction between internalizing and externalizing modes, which is consistent with the literature on psychopathology in adolescents. Also, we demonstrated that these higher-order factors were meaningfully related to coping styles and to internalizing and externalizing behavior problems. However, the unsatisfactory RMSEA value, even after multiple modifications of the model, indicates that replication studies are necessary to investigate whether this four-factor structure can be retained, and whether these four factors (if replicated) are characteristic to adolescents only or are also generalizable to adults. Until then, the first-order model is preferred for use in clinical practice.

The additional SMI scale of Overachieving modes included the Self-Aggrandizer, the Demanding Parent, and the Overcontroller modes. The overachieving component is self-evident in the Demanding Parent mode, which represents a state in which one is very demanding of him- or herself and always strives to do more (Bernstein, Arntz, & de Vos, 2007). The other two modes belonging to this scale also include an overachieving element. For the Self-Aggrandizer mode, the corresponding SMI items seem to represent both an overachieving state in which one desires to be superior or to achieve more (e.g., "It's important for me to be Number One, the most popular, most successful, most wealthy, most powerful)"; "I have to be the best in whatever I do") and an externalizing state in which one gets angry when one's superiority is not respected by other people ("I get irritated when other people don't do what I ask them to do"; "I manipulate to achieve my goals"). Adolescents may be more prone to score higher on the superiority items than adults, as these items are also associated with the important developmental task of identity formation in adolescence.

The third mode belonging to the Overachieving modes was the Overcontroller mode. The Overcontroller mode is known to represent one of two options: a Suspicious Overcontroller mode in which one is always on guard for hidden threats (Bernstein et al., 2007) or a Perfectionistic Overcontroller mode in which order, repetition, or ritual is used to avoid making mistakes (Arntz, 2010). In another version of the SMI (SMI-2), good evidence was found for this

distinction (Bamelis, Renner, Heidkamp, & Arntz, 2010). In the 80-item version of the SMI that we used, inspection of the items of the Overcontroller mode suggests that only one item represents the Suspicious Overcontroller mode ("I look for ways to outsmart people so they won't take advantage of me or hurt me"). The majority of the SMI items belonging to the Overcontroller mode seem to represent the Perfectionistic Overcontroller, as they predominantly relate to keeping control over oneself instead of over a perceived threat (e.g., "If I feel I don't have control over something, I panic"; "I find it difficult to let myself go"). In sum, all three modes belonging to the Overachieving modes are associated with a perfectionistic performance, but the equivocal nature of the Self-Aggrandizer and Overcontroller modes could be problematic. Future research should investigate whether (items of) these SMI scales may need revision, and whether this will lead to a better fit of a higher-order model.

In general, the scales of the SCI and SMI differentiated better between girls from the community and clinical samples than between boys from these samples. This phenomenon has also been found in self-report instruments of emotional and behavioral problems in adolescents (Achenbach & Rescorla, 2001). For the SCI scales of Surrender and Avoidance, there were no differences at all between boys from the community and clinical samples. Perhaps these SCI scales are not sensitive to psychopathology in boys, although conceptually it would be expected that a sample of patients receiving treatment for externalizing behavior problems would display at least more overcompensatory coping. On the contrary, boys from the clinical population scored lower on Overcompensation than boys from the community population. It is possible that the adolescents from the clinical sample were more prone to respond to these items in a socially desirable way, as overcompensatory coping most probably has been labeled as problematic repeatedly during treatment. This social desirability bias has also been found in studies on forensic adult patients (Cima et al., 2003; Keulen-de Vos et al., 2011; Lobbestael, Arntz, Löbbes, & Cima, 2009) and has been labeled "supernormality" by Cima and colleagues (2003). Another explanation could be that boys in our clinical sample felt that, whether due to treatment or not, they have already improved a lot with respect to their overcompensatory coping, and therefore score relatively low on this coping style. Nonetheless, these explanations are not consistent with the finding that boys from the clinical sample did report more (Externalizing) maladaptive schema modes than adolescents from the community sample. Inspection of the items belonging to the Overcompensation scale uncovered one item ("I fantasize to become famous, rich, important, or successful") that could be a normal phenomenon in adolescence. Also, correlation analysis showed that when other coping styles (and maladaptive mode scales) were partialled out, there actually was a weak positive correlation between Overcompensation and Healthy modes.

With respect to the concurrent validity of the SCI and SMI in adolescents, meaningful relations were found between schema coping, schema modes, and behavioral problems. This is in line with previous studies that have demonstrated concurrent validity of the SMI and SCI in adults (Lobbestael et al., 2010; Renner et al., 2013; Rijkeboer & Lobbestael, 2016), and of the SMI-A in adolescents (Roelofs, Muris, & Lobbestael, 2016).

LIMITATIONS AND STRENGTHS

There are several limitations to this study. First, relying solely on self-report instruments for the assessment of schema coping, schema modes, and behavior problems could lead to validity problems. Nonetheless, now that we have provided initial validation for the constructs in adolescents as measured by self-report instruments, future directions include using observer-based measures to assess coping and modes, and to compare them to self-report measures. Second, although our clinical sample included multiple forms of psychopathology (e.g., externalizing pathology, personality pathology, and to a lesser extent internalizing pathology), it was homogeneous in that it comprised only adolescents who were residentially treated for behavioral problems. The question whether the results are generalizable to other clinical adolescent populations remains unanswered. Third, there was only a limited variety of variables with which we could demonstrate concurrent validity of the SCI and SMI. It would be of great value to also include measures of personality pathology and quality of life. So although we provided initial evidence for the validity and reliability of the SCI and SMI in adolescents, additional research is necessary, including test-retest reliability and predictive validity.

There are also some strengths to this study, including the relatively large total sample size, the use of a mixed community and clinical sample, our focus on measurement invariance across the community and clinical sample for the SCI, and our attempt to cross-validate findings for the higher-order model of the SMI.

CONCLUSION

This study demonstrated that schema coping styles and schema modes can be distinguished in adolescents, and that the SCI and SMI generally seem to be reliable and valid instruments to assess these key constructs of schema therapy (ST) in this population. This contributes to the notion that ST is applicable to adolescents and that the SCI and SMI could provide valuable information guiding ST interventions. They could also serve as measures of therapeutic change in adolescents, although more general measures of (personality) pathology should also be included as outcome measures. For example, future studies could investigate whether changes in ST constructs mediate the effect of treatment on general outcome measures. Finally, for a further understanding of the validity of these questionnaires in adolescents, future research should try and replicate our findings in both community and larger, more heterogeneous clinical samples, and should focus on measurement invariance across these samples.

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