

A Validation Study of the Resilience Scale for Adolescents (READ)

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Published online: 7 July 2009
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Abstract In this study, the validity of the recently developed 28-item Resilience Scale for Adolescents (READ) was examined. Survey data from a representative sample of 6,723 Norwegian senior high school students between 18 and 20 years of age were used for this purpose. Validity and reliability were investigated by means of exploratory and confirmatory factor analysis, correlations with other relevant variables, and internal consistency measures. The results supported the construct and convergent validity of the five factors of a modified 23-item version of the scale, which also yielded acceptable psychometric properties. The paper concludes that the modified READ is a valid measure assessing relevant resilience factors with relatively few items, thereby serving as a valuable tool in resilience and risk-factor research.

Keywords Resilience · Scale · Vulnerability ·
Confirmatory factor analysis · Validity

Resilience is commonly defined as a phenomenon or process reflecting relatively positive adaptation despite experiences of significant adversity or trauma (Masten 2001). Significant adversity covers adverse life situations, such as parental psychopathology or low socio-economic status, as well as specific negative life events like childhood

abuse or loss of a significant person. Adversity has in many studies been defined by multiple negative experiences, operationalized through cumulative risk calculations (Wyman et al. 2000). Positive adaptation, on the other hand, has been defined as developing a substantially better level of functioning than would be expected given exposure to significant risk (Luthar 2006). This has often been operationalized in terms of health, social skills, and meeting age-appropriate developmental tasks (Luthar 1991, 2006).

Resilience has received considerable attention in psychopathological research in recent years, as research in this field can provide important knowledge about how to support healthy development in difficult circumstances. However, despite of the increase in resilience research, there has been a lack of measurement instruments to assess resilience factors. Particularly for adolescents, no such scale was available until recently. The intent of this paper is therefore to validate the newly developed Resilience Scale for Adolescents (READ).

Resilience Factors in Research on Adolescents

Resilience may be explained by three categories of factors, namely positive individual factors, family support, and a supportive environment outside the family. Positive individual factors include robust neurobiology, adaptive temperament, intelligence, and self-system variables such as beliefs about self-worth, control and future expectations (Olsson et al. 2003; Wyman et al. 2000). One instance of such a self-system variable is the construct of hardiness, which is characterized by interpreting potential stressful situations as meaningful and interesting, perceiving stressors as changeable and viewing change as offering opportunity rather than as posing threat (Funk 1992;

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Kobasa et al. 1982). It has been shown that hardy individuals demonstrate less negative reaction to both moderately stressful and highly traumatic experiences compared to persons who do not share this trait to the same degree (see Vogt et al. 2008). Thus, hardiness can be seen as an example of a positive individual factor enhancing resilience.

Concerning functional family relationships, it has been shown that a variety of positive family characteristics appear to be positively related to resilience in adolescence (Olsson et al. 2003; Wyman et al. 2000). Such characteristics include a stable living situation, residing with both parents (DuMont et al. 2007), the availability of emotional support (Heller et al. 1999), and a low degree of parental discord (Collishaw et al. 2007). Moreover, positive parent-child attachment, parental warmth, care, and a coherent, non-blaming parenting style have also shown to be highly protective against a number of different risk factors (Luthar 2006; Olsson et al. 2003).

A supportive environment outside the family includes characteristics of the neighbourhood, school and availability of social support and positive role models outside the family (Werner and Smith 1982). Such resources include positive teacher and peer influences, which have been shown to be positively related to adolescent resilience (Olsson et al. 2003). Similarly, growing up in a disadvantaged neighbourhood has proven to be associated with an increased risk of child maltreatment and poorer adjustment (DuMont et al. 2007).

There is general consensus among resilience researchers regarding these three overarching categories (Garmezy 1993; Olsson et al. 2003; Werner and Smith 1992), which may—in the absence of a unifying theory or definition—serve as a guiding principle for developing operationalizations of resilience. It is, therefore, important to develop valid and reliable measures of the intra- and interpersonal protective factors covering these three categories.

Measurement of Resilience in Adults

In recent years, several resilience scales for adults have been developed, such as the Connor-Davidson Resilience Scale (CD-RISK; Connor and Davidson 2003) and the Brief Resilient Coping Scale (Sinclair and Wallston 2004). However, these scales principally measure personal dispositions, which is only one of the three overarching protective factors. The Resilience Scale for Adults (RSA) was therefore developed as a more comprehensive measure to cover factors from all three categories. The Resilience Scale for Adolescents (READ), as validated in this paper, was developed as an adaptation of the RSA for specific use with adolescents.

The RSA was itself developed on the basis of a content analysis of resilience factors presented in international journals (Hjemdal et al. 2001). These factors were sorted into 13 groups covering the three overarching categories listed above. In all, 295 items across these 13 groups were generated for measuring adult resilience. Through careful, step-wise selection of the most relevant items, the total number of original items was reduced in several studies by means of exploratory and confirmatory factor analyses (Friborg et al. 2005; Friborg and Hjemdal 2004; Friborg et al. 2003; Hjemdal et al. 2006), a process resulting in the final 33-item version of the RSA. In the RSA, a semantically differential response format was used, where the end-points of the seven-point scales were anchored by pairs of statements, as in “My plans for the future are...”, with end-point statements “[1] difficult to accomplish” and “[7] possible to accomplish”. The RSA has been shown to differentiate between out-patients and normal samples, as well as between highly adaptive and more vulnerable personality profiles (Friborg et al. 2003).

Development of the Resilience Scale for Adolescents (READ)

When adapting the RSA to adolescence, the original response format proved to be too complicated when the items were tested on a group of adolescents in a pilot study. Items were then changed to a 5-point Likert response format (1 = totally disagree, 5 = totally agree) with exclusively positively phrased items, such that high scores indicate high resilience for all items. Moreover, the wording was simplified in order to better accommodate adolescents. For instance, “If I encounter significant obstacles, I can succeed by working hard” was changed to “I will reach my goal if I work hard”. As the development of the READ was based on the RSA, which initially contained five factors, a confirmatory factor analysis with a five-factor solution was undertaken, resulting in a relatively good fit (Hjemdal et al. 2006). The factors were labelled 1) Personal Competence, 2) Social Competence, 3) Structured Style, 4) Family Cohesion, and 5) Social Resources. Cronbach’s alpha varied between .85 and .69. Moreover, two studies found expected correlations in negative constructs such as negative life events, bullying, depressive symptoms, and symptoms of social anxiety as well as in positive constructs such as membership in athletic clubs, team sports, and physical activity. (Hjemdal et al. 2007, 2006).

Both these studies supported the validity of the scale, however there were several limitations to the READ validations in these papers. First, the samples of adolescents were drawn from only five junior high schools in one Norwegian county. The age-span of the participants was

restricted to between 13 and 15, thereby only covering the early adolescent years. A sample from a larger selection of schools, a wider geographical area, and spanning a larger age-bracket is clearly needed for further validation of the scale.

Second, the sample itself was rather small. The 421 students participating in the study were divided into two sub-samples for cross-validating purposes, such that the factor structure of the READ was tested on just over 200 individuals in each group. The initial confirmatory factor analyses in the development of the READ were thus based on less than six observations for each item, which is generally considered to be a low ratio. Studies using Monte Carlo simulations have further suggested that, to detect misspecified confirmatory factor analytic models, at least 400 observations should be made, particularly when the items deviate from normality as was the case in Hjemdal et al.' (2006) study (see Jackson 2007). The adequacy of the factor structure of READ in the Hjemdal and colleagues research has therefore to be further confirmed by larger scale studies.

Third, the factor structure of the READ was only tested by means of confirmatory factor analyses. Such analyses are useful to evaluate factor structures stated a priori. However, they do not inform about the adequacy of alternative factor structures which are not explicitly proposed. Exploratory factor analyses can provide just such information and would, therefore, be an important supplement to validate the READ in addition to confirmatory factor analyses.

Fourth, the convergent validation of the READ was rather restricted as only a few other constructs were included in the primary studies. These included symptoms of depression and social anxiety, negative life events, being bullied, and participation in sports and physical activities. The relationship to other important constructs, such as other internalizing psychological problems, behavioral problems, substance abuse, parental relations, and social support remains to be investigated. Nor has convergent validity yet been examined for boys and girls separately. Such analyses could provide information about potential gender differences in the scale's validity. These could likely occur, as it is well established that there are substantial differences in mental health, conduct problems, and social network between boys and girls.

Fifth, it remains to be investigated whether the factor structure of the READ varies among different sub-groups in the population. In particular, neither potential gender differences in the factor structure of READ, nor differences between respondents with and without mental health problems have to date been examined. Such tests would assess the scale's applicability to different groups of respondents.

Finally, the face validity of some of the READ scale items can be questioned. For instance, item #18 ("In my family we have rules that simplify everyday life"), originally designed to load on the Structured Style factor, may in fact also be related to the Family Cohesion factor, since the item's content can be considered to address both level of structure as well as family issues.

Aim of the Paper

The READ can be an important tool in assessing the impact of several resilience factors when investigating the relationship between risk and psychological outcome and development. Some valuable information about the validity of the scale has been provided, though further evidence is needed. The aim of this paper is to obtain such information by using data from a large-scale, representative sample of Norwegian senior high school students aged between 18 and 20 years. The analyses in the present study will indicate modifications of the scale if the level of fit requires so.

Methods

Procedure and Participants

Data were obtained from a national survey conducted in Norway in 2007 (Mossige and Stefansen 2007). The study was originally undertaken to obtain information about violence and sexual abuse among adolescents. A nationwide sample of 9,085 students in their final year of senior high school (aged between 18 and 20 years) was selected in a two-stage manner from stratified areas. First, all senior high schools in Norway were categorized into five geographical strata to ensure geographical representativeness. Second, the schools were stratified within each region according to academic high schools, vocational high schools, and schools with both curricula (3 strata). The 67 participating schools were thereafter drawn according to strata size, ensuring proportional allocation. All final year students from the selected schools were asked to complete a questionnaire during two consecutive school hours covering a broad range of topics in addition to violence and sexual abuse. Those not present when the study was carried out, were asked to participate at a later date. The regional committee for medical research ethics endorsed the project.

Measures

In addition to the READ scale, participants were asked to respond to the following scales and items in the questionnaire.

Age, Gender, Socio-Economic Status (SES), and School Grades

The participants' age and gender were recorded. To obtain information about SES, respondents were asked to indicate their parents' level of education. They were further asked to indicate the financial situation of the family over the past 2 years, ranging from "1—we have had a bad financial situation the whole time" to "5—we have had a good financial situation the whole time". The respondents reported the last school grades they received in Norwegian, mathematics, and English. A mean score was computed for these three subjects.

Family and Friends

The respondents' parents' living arrangement was assessed; whether they lived together, had divorced, or never shared a household. Furthermore, a 10-item short version of the Parental Bonding Instrument was included in the questionnaire (Parker 1990; Parker et al. 1979). The instrument assesses two factors—parental overprotection and parental care—with satisfying internal consistency obtained for both ($\alpha=.74$ and $\alpha=.71$, respectively). Respondents indicated as well whether they had siblings and if they had at least one close friend.

General Health and Contact with Social and Health Services

The respondents were asked to indicate how they evaluated their general health (from "1—very bad" to "5—very good") with one item, and whether they had been in contact with child protection services, the school psychologist, or a child guidance clinic.

Internalizing Mental Health Problems

Symptoms of anxiety were assessed by six items from the Hopkins Symptom Check List (Derogatis et al. 1974; Hammer and Vaglum 1990). Depressive symptoms were measured by Kandel and Davies' (1982) 6-item Depressive Mood Inventory. Both scales showed good internal consistency ($\alpha=.82$ and $\alpha=.87$, respectively). Suicidal ideation was measured by one item assessing whether the respondents had experienced suicidal thoughts; respondents were further asked to indicate whether they had deliberately harmed themselves and ever in fact attempted suicide. Finally, unhealthy dieting behavior was measured by four items from the Eating Attitude Test (Garner and Garfinkel 1979; Garner et al. 1982) and satisfaction with own appearance was assessed by the 5-item Physical Appearance subscale of the Self-Perception Profile for Adoles-

cence (Harter 1988; Wichstrøm 1995). Measures of internal consistency indicated good reliability for both scales ($\alpha = .86$ and $\alpha = .90$, respectively).

Drug Use and Conduct Problems

Alcohol use was measured by asking respondents if they had ever felt clearly intoxicated due to alcohol consumption, and if so how often over the past 12 months (from "0—never" to "5—several times a week"). Smoking behavior was assessed by recording whether or not respondents smoked daily. Illicit drug use was measured by three items asking about the use of medication, marijuana, and other forms of illicit drugs for the purpose of intoxication over the past 12 months. A dummy variable was constructed to indicate whether respondents had indeed used illicit drugs. Respondents were further asked whether they had stolen items worth more than 100 Norwegian Crowns (about \$15) over the past 12 months. Finally, three questions assessing different kinds of violent behavior engaged in over the past 12 months were used to assess anti-social behavior. A dummy variable was constructed to determine the presence or absence of such behaviors during the past 12 months.

Being Bullied

Three items were used to assess whether the respondent reported being bullied over the past 12 months. A dummy variable was constructed whereby exposure to at least one type of bullying was contrasted with no bullying experiences.

Analyses

For all factor analyses, the statistical program Mplus 5.1 was used (Muthén and Muthén 1998–2007). Robust Maximum Likelihood Estimation procedures were employed to account for non-normality. Missing data were handled by the Full Information Maximum Likelihood procedure. Since respondents were recruited from 67 different schools, standard errors and fit indices were computed by taking into account cluster sampling. For this purpose, potential non-independence of observations due to school clusters was addressed by estimating parameters by maximizing a weighted log-likelihood function, whereas standard error estimations were performed with a sandwich estimator (Muthén and Muthén 1998–2007). For an initial test of the validity of the READ, explorative factor analysis with direct quartimin rotation was conducted. To evaluate the number of factors to be extracted, eigenvalues and scree-plots were examined, as well as model fit indices (as suggested by Fabrigar et al. 1999). For all factor models, fit was evaluated by inspecting the Comparative Fit Index

(CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Confirmatory factor analyses were also performed. In these analyses, cross-validation of the factor structure of the READ was undertaken by first randomly selecting data from 1,000 participants and testing the adequacy of the factor structure of the READ. Modification indices were inspected to explore possible options for adjusting the measurement model. Thereafter, the rest of the sample was used to cross-validate the structure and to conduct additional analyses to validate the scale. Multiple group analyses were performed to compare factor structures for girls and boys as well as factorial differences between informants with high and low loads on negative affectivity. The chi-square difference test suggested by Satorra and Bentler (2001) was used to compare model fit for nested models.

Internal consistency of the scales was evaluated by computing Cronbach’s alpha. T-tests were conducted to examine gender differences for the five factors of the READ and Cohen’s *d* were computed as measures of effect size (Cohen 1988). Convergent validity was evaluated by correlating the five factors of the READ for boys and girls separately with several other scales where different patterns of correlation for the five factors were expected.

Results

In total, 7,033 students completed the questionnaire, setting the response rate at 77.4%. Data from respondents younger than 18 and older than 20 were excluded from the analyses, as it is atypical for students to be in their last year of senior high school at these ages. Furthermore, data from 76 students was removed because they had not reported their gender. A total of 291 respondents were thus eliminated, such that data from 6,723 respondents were ultimately included in the analyses, with a mean age of 18.3 (standard deviation = .55 years). Of them, 3,940 students (58.6%) were female and 2,783 (41.4%) were male. The preponderance of girls in the sample was due to the fact that the data were collected at a time when many of the students in

vocational schools were fulfilling their external internship requirements; the over-representation of male students in such training streams resulted as such in comparatively fewer boys completing the questionnaire than girls.

Exploratory Factor Analyses

An exploratory factor analysis was conducted as a first examination of the factor structure of the READ. The first five factors had eigenvalues greater than 1, whereas those of the following factors were less than 1. The scree-plot was somewhat inconclusive, as it was difficult to observe a sudden drop in the plot. Fit indices indicated a satisfying fit for the five-factor solution ($\chi^2[248] = 4535.73$; CFI = .94; TLI = .90; RMSEA = .056 [.055–.058]), but not for models with fewer factors. Moreover, in the five-factor model, most of the items loaded highly on the factor they were hypothesized to load on. Six items, however—three from the Personal Competence factor, two from the Social Resources factor, and one from the Structured Style factor—showed relatively low item loadings (<.3) with their respective factor. These low factor loadings indicate that there may be room to improve the scale.

Confirmatory Factor Analyses

Confirmatory factor analyses with the five subscale items were conducted by using a random subsample of 1,000 respondents. In the first step, separate analyses were conducted for every factor, where models were constructed such that all items for every factor loaded on one factor. The results of these analyses are presented in Table 1, and show that the fit indices for the factors Structured Style, Family Cohesion, and Social Resources indicated acceptable fit, whereas the RMSEA for the Personal Competence and Social Competence factors were somewhat less satisfying (near or over .08). As a result, one item in each of the two factors was removed because of the high inter-correlations of their error-terms with other items’ residual (Personal Competence: “My belief in myself gets me through difficult times” [READ item #23] and Social

Table 1 Confirmatory factor analyses for the READ factors (N=6,723)

	# of items	df	χ^2	CFI	TLI	RMSEA	90% CI
Personal Competence	8	20	130.40	.95	.93	.075	.063–.087
Social Competence	5	5	42.65	.97	.93	.087	.064–.112
Structured Style	4	2	8.50	.99	.97	.057	.022–.100
Family Cohesion	6	9	48.38	.99	.98	.067	.049–.086
Social Resources	5	5	21.68	.98	.96	.058	.038–.084
<i>Modifications:</i>							
Personal Competence	7	14	41.45	.98	.97	.045	.029–.061
Social Competence	4	2	2.99	1.00	1.00	.022	.000–.071

df degrees of freedom; *CFI* Comparative Fit Index; *TLI* Tucker-Lewis Index; *RMSEA* Root Mean Square Error of Approximation; 90% *CI* 90% confidence interval of RMSEA

Competence: “I am good at talking to new people” [READ item #16]). After removing the items, a good fit was obtained for these two factors as well.

In the next step, all 26 remaining items were included in a combined model with five inter-correlated resilience factors. The CFI and TLI indicated that there was room for improving the model fit ($\chi^2[289] = 1,348.55$; CFI = .88; TLI = .87; RMSEA = .061 [.058–.064]), whereas the RMSEA indicated an acceptable model fit. The modification indices showed that the poor fit was due to i) item #18 (“In my family we have rules that simplify everyday life”), which was designed to load on the Structured Style factor, but showed also considerably high factor loadings on the Family Cohesion and Social Resources factors; ii) item #4 (“I am satisfied with my life up till now”), designed to load on the Personal Competence factor, but which also showed considerably high factor loadings on the Family Cohesion and Social Resource factors; and iii) item #1 (“I reach my goals if I work hard”), where the error-term showed high correlations with other items’ error-terms. These three items were therefore excluded from the model, with the resultant 23-item model showing an acceptable fit ($\chi^2[220] = 812.28$; CFI = .94; TLI = .93; RMSEA = .052 [.048–.056]). The model was also compared to one where all 23 factors loaded on one general resilience factor; the fit indices of this model clearly indicated a non-adequate fit ($\chi^2[230] = 2141.58$; CFI = .75; TLI = .73; RMSEA = .092 [.088–.095]).

The results from the analyses were further cross-validated by applying the same model to the remaining 5,742 respondents not used in the first sample. Aside from the χ^2 -value, which is heavily dependent on sample size, almost identical fit indices were obtained between this sample and the first ($\chi^2[220] = 3,875.27$; CFI = .94; TLI = .93; RMSEA = .054 [.052–.055]). In Table 2, the standardized factor loadings from this analysis are presented. The table shows that all beside of one item (item # 12, which loaded .49 on the Personal Competence factor) loaded higher than .60 on the factor they were constructed to be a part of.

In the following step, potential gender differences in the measurement model were tested by means of multiple group analysis whereby groups were defined by gender. A chi-square differences test (Satorra and Bentler 2001) was conducted to assess whether a factorial invariant model resulted in a significantly poorer fit than when the factor loadings were allowed to differ freely for boys and girls. The results show that setting the factor loadings equal in both groups indeed resulted in a poorer fit (corrected χ^2 -difference[18] = 102.49, $p < .01$). However, since the χ^2 -value depends on sample size, and a large sample was used in this analysis ($N > 5,000$), statistically if not substantially significant gender differences may have been obtained. Model fit indices with values not influenced by sample size

Table 2 Standardized factor loadings for the final 23-Items READ scale ($N=6,723$)

Item Number and Content	Standardized Factor Loadings
<i>Personal Competence</i>	
7 goal orientation	0.77
12 realism	0.49
17 competence	0.73
20 self-confidence	0.75
26 positive outlook	0.73
<i>Social Competence</i>	
6 positive social orientation	0.82
11 making contact	0.74
22 humour	0.74
25 comforting others	0.69
<i>Structured Style</i>	
2 aims and objectives	0.68
8 planfulness	0.76
13 organizational skills	0.68
<i>Family Cohesion</i>	
5 shared values	0.80
10 comfort	0.82
21 common positive outlook	0.76
24 support	0.85
27 shared activities	0.75
15 common perspective	0.77
<i>Social Resources</i>	
3 encouragement	0.77
9 cohesion	0.67
14 support	0.81
19 help	0.78
28 appreciated by others	0.83

were therefore compared for the two group models with and without restricting the factor loadings to be invariant over gender. The results showed literally no difference in fit-indices for the models (CFI = .91; TLI = .90; RMSEA = .055 in both models), confirming that the factor structures for boys and girls were similar.

Moreover, differences in model fit were measured between the 10% of the sample with the highest scores on negative affect (i.e. those scoring highest on symptoms of anxiety and depression) and the rest of the sample. Here, too, the results showed that setting the factor loadings as equal in both groups resulted in a significantly poorer fit as compared to the model where factor loadings were allowed to vary freely between the two groups (corrected χ^2 -difference[18] = 206.88, $p < .01$). However, here as well, only small differences in the model fit-indices for the two models were obtained (CFI = .90; TLI = .90; RMSEA = .055 in the more restraint model; CFI = .91; TLI = .90;

RMSEA = .055 in the less restraint model), indicating that the factor structure was similar between the highest symptom scorers and the others.

Reliability Analyses

Cronbach’s alphas were computed for all five factors. The following results were obtained: Personal Competence, $\alpha=.76$; Social Competence, $\alpha=.77$; Structured Style, $\alpha=.69$; Family Cohesion $\alpha=.89$; and Social Resources $\alpha=.79$. Thus, all factors showed acceptable internal consistency reliability, aside from the Structured Style factor with α just below .70, which is generally considered the baseline value for acceptability (see e.g., Nunnally and Bernstein 1994). The somewhat low internal consistency of the factor is likely due to the fact that it only consists of three items.

Gender Differences in Mean Scores of the Scales

T-tests were conducted to examine gender differences for the five factors of the READ. As displayed in Table 3, gender differences for all five factors were found: Girls scored significantly higher on Structured Style and Social Resources, whereas boys scored higher on the other three factors. However, the values of Cohen’s *d* indicated that the gender differences were small for all factors other than Personal Competence, where a medium-sized gender difference emerged whereby males had on average a substantially higher score than females.

Convergent Validation

The five factors of the READ were correlated with a number of other social and psychological variables to investigate their convergent validity. The results of these analyses are displayed in Tables 4 and 5 for girls and boys, respectively. Bold numbers in the two tables indicate correlations that were a priori expected to be particularly strong.

The tables show that there were few substantial gender differences in the patterns of correlation between the READ factors and other psychological measures. However, the inter-correlations between the five READ factors were somewhat

lower for girls than boys, landing primarily between $r=.46$ and $r=.65$ for both genders. The Structured Style factor deviated from this pattern by correlating to a lesser extent with all other factors than Personal Competence.

The five resilience factors showed small to moderate correlations with the indicators of SES and school grades. Whether or not parents lived together and parental care and overprotection was most strongly correlated to Family Cohesion compared to the other four resilience factors. The correlation between having siblings and the resilience factors was small. Close friendship was most predictive of the Social Resources and Social Competence factors.

Evaluation of low general health and having contact with social and health services was related to generally lower scores on almost all resilience scales. The correlations were somewhat higher for girls than boys. All resilience factors were significantly related to anxiety, depression, suicidal ideation, and self-harm for both genders, such that high resilience corresponded to poor mental health. As expected, the strongest correlation was between Personal Competence and anxiety and depression. Satisfaction with own appearance was as well highly correlated to Personal Competence, but somewhat more weakly to all other factors. Unhealthy dieting behavior showed no or less correlation to all factors.

Alcohol intoxication, smoking, illicit drug use, and anti-social behavior (theft, violence) showed small or insignificant correlations with the five resilience factors for both boys and girls. Likewise, small if significant negative correlations were obtained between being bullied and resilience factors for both genders.

Discussion

In this study, the validity of the Resilience Scale for Adolescents (READ) was assessed and the scale modified by taking into account results from factor analyses. Internal consistency and convergent validity of the scale were as well examined.

The results from the exploratory factor analysis supported a five-factor solution, but also indicated room for improvement on the original 28-item measure, since a few

Table 3 Mean scores and standard deviations and gender differences in means for the five resilience factors

	<i>N</i> =6,723		Females		Males		Gender difference	
	Mean	Sd	Mean	Sd	Mean	Sd	Cohen’s <i>d</i>	<i>t</i>
Personal Competence	3.62	.76	3.49	.76	3.79	.72	.41	16.26**
Social Competence	4.03	.73	4.00	.72	4.06	.74	.08	3.06**
Structured Style	3.50	.84	3.54	.82	3.43	.87	.13	5.28**
Family Cohesion	4.05	.80	4.03	.83	4.08	.75	.06	2.42*
Social Resources	4.48	.60	4.51	.59	4.45	.61	.10	4.05**

Sd Standard deviation
 * = $p < .05$; ** = $p < .01$

of the factor loadings were relatively low. Results from confirmatory factor analyses further confirmed that the factor structure of the original 28-item measure could benefit from modification. Acceptable fit—both for all factors and the overall model—was obtained when five items were removed from the scale. The adequacy of this model was further confirmed by cross-validation by fitting the same model to the remainder of the sample. The results are in accordance with the content of the excluded items. For instance, the exclusion from the scale of item #18 (“In my family we have rules that simplify everyday life”) can not only be justified statistically by showing a high unintended factor loading with the Family Cohesion factor, but also conceptually, since the item taps information about the respondent’s family as well as about structured personal

style. The different results of the confirmatory factor analysis in the current study compared to Hjemdal et al.’ (2006) paper may be due to the small sample size in their study, which can lead to unstable fit indices when misspecified models are tested (Jackson 2007). The difference in the age span included in the present sample and Hjemdal et al.’ (2006) may also be of relevance.

Internal consistency analyses provided evidence for acceptable reliability of the scale for this sample, even though the alpha value for the Structured Style factor was somewhat low. Results from the analyses of gender differences of the READ factors were similar to results from Hjemdal et al.’ (2006) study. Moreover, the substantially higher scores of males on the Personal Competence factor are in congruence with research showing that boys on

Table 4 Correlations of five resilience factors with psychological and social variables for girls

<i>N</i> =3,940	Personal Competence	Social Competence	Structured Style	Family Cohesion	Social Resources
Social Competence	.59**				
Structured Style	.62**	.37**			
Family Cohesion	.52**	.46**	.36**		
Social Resources	.52**	.56**	.33**	.65**	
Age	.01 ns	.00 ns	.01 ns	.01 ns	-.03 ns
Length of parents’ education	.06**	.04**	.05**	.06**	.06**
Family economy	.20**	.16**	.15**	.24**	.21**
School grades	.15**	-.04*	.17**	.08**	.08**
Living together with both parents	.08**	.03*	.07**	.18**	.10**
Parental overprotection	-.16**	-.10**	-.09**	-.36**	-.25**
Parental care	.27**	.26**	.15**	.62**	.47**
Siblings	.00 ns	.01 ns	-.01 ns	.02 ns	.01 ns
Close friendship	.19**	.32**	.09**	.23**	.39**
Evaluation of general health	.35**	.26**	.28**	.31**	.29**
Contact with social and health services	-.19**	-.11**	-.12**	-.24**	-.18**
Symptoms of anxiety	-.41**	-.23**	-.21**	-.36**	-.32**
Depressive symptoms	-.48**	-.24**	-.27**	-.40**	-.38**
Suicidal ideation	-.29**	-.20**	-.15**	-.28**	-.30**
Self harm	-.27**	-.14**	-.19**	-.27**	-.24**
Parasuicide	-.19**	-.10**	-.09**	-.22**	-.20**
Unhealthy dieting	-.12**	-.03 ns	-.01 ns	-.12**	-.13**
Appearance satisfaction	.44**	.31**	.25**	.31**	.31**
Alcohol intoxication	-.10**	.09**	-.14**	-.07**	.03 ns
Daily smoking	-.09**	.02 ns	-.13**	-.10**	-.02 ns
Use of illicit drugs	-.15**	-.06**	-.16**	-.17**	-.12**
Theft	-.04*	-.03 ns	-.05**	-.06**	-.05**
Violent behavior	-.10**	-.05**	-.09**	-.12**	-.09**
Being bullied	-.09**	-.08**	-.06**	-.15**	-.18**

ns non significant

Bold numbers indicate correlations where particularly high relations were expected a priori

* = $p < .05$; ** = $p < .01$

Table 5 Correlations of five resilience factors with psychological and social variables for boys

<i>N</i> =2,783	Personal Competence	Social Competence	Structured Style	Family Cohesion	Social Resources
Social Competence	.65**				
Structured Style	.61**	.42**			
Family Cohesion	.59**	.56**	.44**		
Social Resources	.57**	.63**	.37**	.73**	
Age	-.03 ns	.02 ns	.00 ns	-.03 ns	-.04*
Length of parents' education	.07**	.03 ns	.03 ns	.07**	.07**
Family economy	.17**	.14**	.11**	.24**	.24**
School grades	.09**	-.05*	.09**	.08**	.09**
Living together with both parents	.03 ns	.00 ns	.05**	.14**	.06**
Parental overprotection	-.19**	-.16**	-.08**	-.33**	-.31**
Parental care	.27**	.27**	.16**	.54**	.46**
Siblings	.01 ns	.01 ns	.03 ns	.05*	.04*
Close friendship	.25**	.37**	.15**	.28**	.38**
Evaluation of general health	.31**	.28**	.24**	.30**	.28**
Contact with social and health services	-.11**	-.04*	-.03 ns	-.15**	-.12**
Symptoms of anxiety	-.32**	-.22**	-.16**	-.29**	-.29**
Depressive symptoms	-.40**	-.25**	-.24**	-.37**	-.34**
Suicidal ideation	-.28**	-.21**	-.10**	-.25**	-.31**
Self harm	-.13**	-.11**	-.06**	-.17**	-.15**
Parasuicide	-.10**	-.08**	-.00 ns	-.14**	-.13**
Unhealthy dieting	-.03 ns	-.03 ns	.04*	-.07**	-.08**
Appearance satisfaction	.39**	.34**	.21**	.30**	.31**
Alcohol intoxication	-.01 ns	.12**	-.12**	-.08**	.03 ns
Daily smoking	-.07**	.01 ns	-.07**	-.10**	-.05**
Use of illicit drugs	-.08**	.00 ns	-.11**	-.14**	-.08**
Theft	-.03 ns	.01 ns	-.04 ns	-.07**	-.05*
Violent behavior	.00 ns	.06**	-.06**	-.06**	-.02 ns
Being bullied	-.08**	-.06**	-.04*	-.13**	-.13**

ns non significant

Bold numbers indicate correlations where particularly high relations were expected a priori

* = $p < .05$; ** = $p < .01$

average score higher than girls on constructs such as general self-esteem and self-efficacy, which are conceptually related to the Personal Competence factor (e.g., Feingold 1994).

Further, the current study offered detailed information about the convergent validity of the READ. The finding that the pattern of correlations between the READ factors and other psychological measures did not differ considerably for girls and boys supports the notion that the convergent validity of the scale was relatively stable in relation to gender. The high correlation of the Personal Competence factor to internalizing psychological problems supported the importance of this factor for psychological health. The relatively high correlations of Social Competence with having a close friend and parental care support

the factor's relationship to social contacts. In addition, the correlation between this factor and appearance satisfaction is in congruence with the importance of appearance in social settings. Structured Style showed relatively low correlations to the other variables included in the study, which may reflect that a structured style of living, in fact, is less protective for mental health problems measured in the present study than the other four resilience factors. The relatively low correlation with the other four resilience factors furthermore underlines the somewhat different position of this factor. However, the correlations between school grades and the five resilience factors for girls were highest for Structured Style, suggesting that a structured way of working constitutes a resilience factor for females in the academic domain. The high positive correlation

between Family Cohesion and parental care confirmed the validity of this factor, as further supported by the negative correlation between parental over-protection and Family Cohesion. Social Resources also showed a substantial but somewhat lesser correlation to the two factors of the Parental Bonding Instrument, thereby illustrating the importance of parents in providing social support. The social importance of having a close friend was further reflected by the positive correlation between having a close friend and the Social Resource factor.

Analyses conducted to test for convergent validity (see Tables 4 and 5) show that the correlational patterns of some of the social and psychological variables with the READ were fairly similar across all five READ factors. This and the substantial correlations between the five resilience factors may indicate that having resilient resources in one domain increases the probability of such resources in others as well. However, the results may also indicate that—even though factor analyses confirmed the five factor structure—a general resilience factor may underlie all five resilience factors.

Finally, an interesting finding in this study is that while relatively high negative correlations were found between internalizing psychological problems and several of the resilience factors, and the relatively low correlations between behavioral problems—including substance abuse—and the five resilience factors. This may indicate that the READ scale measures protective resources that are more closely associated with internalizing psychological problems than behavioral issues.

Limitations and Conclusion

The current study shows that a 23-item version of the READ has a good factor structure, shows satisfying reliability, and acceptable convergent validity when assessed in a sample of 18 to 20-year olds. In this study, a large, representative sample was used yielding a fairly high response rate. Adequate statistical methods were employed to examine the validity of the scale, including estimation methods to handle missing data, non-normality, and school-clustering. Furthermore, differences in the factor structure of the READ between girls and boys and between adolescents with high and low negative affect were tested for the first time. The inclusion of a variety of social and psychological variables when examining convergent validity further strengthened the study.

However the study has limitations. First, the age of respondents was rather restricted; as a consequence, the results may only be valid for older adolescence. As well, the generalizability of the results is limited by the fact that a Norwegian sample was used, with as such a relatively homogeneous, mainly Caucasian composition. Other results

might therefore be obtained in other countries and for other ethnic groups. English, French, Portuguese, Spanish, and Lithuanian versions of the READ have already been developed, but no studies applying these versions have as yet been published. Third, no estimates of test-retest reliability could be provided in the current study, since the sample was only assessed once. Such information could give additional insight into the scale's reliability. Fourth, as noted by Hjemdal et al. (2006), a next step in the validation of the READ would be to select a sample consisting of individuals who have successfully adapted to and dealt with stress and adversity. In this respect our paper is limited in that it is based on data from a normal population study; the sample's characteristics, however, had the advantage that the functioning of the scale in a representative sample could indeed be evaluated. A final limitation of the scale is that the Structured Style factor in the revised form only consists of three items, and consequently bears somewhat low reliability. In the future, additional items for this subscale should be constructed to increase its reliability.

In conclusion, the READ provides an exciting possibility to assess several different resilience factors with relatively few items, and can thus be used as a valuable measurement tool in resilience and risk factor research. We recommend the scale for use in research settings where a variety of resilience factors need to be assessed with relatively few items. Furthermore, results from this and previous studies support use of the scale during all of adolescence, from 14 to 15 years of age up to 18 to 20 years of age. The scale may also be relevant in more applied settings, where it could be used to identify strengths and weaknesses in life areas that may enhance resilient outcomes in adolescents exposed to risk. Moreover, since the READ has proven to be relatively highly correlated to internalizing psychological problems, further studies may explore whether the scale can be used as a risk screening instrument for such problems. Application of the READ scale can thus contribute to a better understanding of resilience in research, prevention, and intervention.

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