Validation of the Resilience Scale for Adolescents (READ) in Ireland: a multi-group analysis

YVONNE KELLY, AMANDA FITZGERALD & BARBARA DOOLEY

School of Psychology, University College Dublin, Dublin, Ireland

Key words

resilience, adolescent psychiatry, psychometrics, measurement invariance, adolescence

Correspondence

Amanda Fitzgerald, School of Psychology, University College Dublin, Newman Building, Belfield, Dublin 4, Ireland.
Email: amanda.fitzgerald@ucd.ie

Received 24 September 2015;
revised 22 December 2015;
accepted 14 March 2016

Abstract

Resilience is a process reflecting positive adaptation in the face of adversity. The Resilience Scale for Adolescence (READ) incorporates intrapersonal and inter-personal protective factors mapping onto the three salient domains of resilience, including individual, family and external environment. This study investigated the validity and reliability of the READ by means of factor analysis, multi-group analysis, inter-correlations and internal consistency measures. Participants were 6085 young people in Ireland aged 12–18 years. Participants completed the My World Survey – Second Level (MWS-SL), assessing risk and protective factors of mental health. Confirmatory factor analysis validated the original five-factor structure of the READ including Personal Competence, Social Competence, Structured Style, Family Cohesion, and Social Resources, $\chi^2(340)=6146.02$, $p<0.001$, RMSEA=0.056 (90% CI=0.054–0.057), CFI=0.97; GFI=0.93. Measurement invariance indicated that the five-factor structure was similar across gender, school cycle and distress levels. Construct validity was evident, by correlating the five factors of the READ with various social, psychological and behavioural variables. The findings suggest that the READ is a valid measure to assess resilience factors among adolescents in Ireland, demonstrating its applicability in a different cultural context and with a wider age range of adolescents. Copyright © 2016 John Wiley & Sons, Ltd.

Introduction

Resilience is an area that has received considerable attention over the last two decades, due to its potential for identifying protective factors essential for preventing mental health difficulties (Hjemdal *et al.*, 2007). Resilience is defined as “The protective factors, processes and mechanisms that contribute to a good outcome despite experiences with stressors shown to carry significant risks

for developing psychopathology” (Hjemdal *et al.*, 2006, p. 84). The challenge of defining the construct of resilience has been identified and thus has created various factors contributing to resilience in adolescence.

Early research on resilience focused on a person’s adverse life events, such as parental mental illness (Rutter *et al.*, 1979) or chronic illness (Wells and Schwebel, 1987), and how the presence of risk factors increased a

child's likelihood of developing a difficulty later in life (Kraemer *et al.*, 1997). Today, the importance of focusing on the strengths and assets of the individual rather than the risks, has been recognized as the future of resilience (Fergus and Zimmerman, 2005). Resilience is now recognized as not only the mere absence of risk, but rather the presence of protective factors that buffer effects of adversity (Hjemdal *et al.*, 2006). Three overarching themes of resilience have been extensively studied, namely attributes of the individual, aspects of the family, and the external environment. Werner *et al.* (1971) highlighted important features of these three protective factors. Having a higher degree of social maturity (Werner and Smith, 1982), resourcefulness, the use of intellect and talents, and a positive belief that life would make sense in adulthood (Werner and Smith, 2001) were identified as important attributes of the individual. Having smaller families with, less than four children (Olsson *et al.*, 2003), with an older and more educated mother (Hawley and DeHaan, 1996) were identified as important aspects of the family. The importance of having a caring teacher, elderly mentor or caring adult available outside of the family (Beam, 2002) was an important contributor to the wider environment. This view of resilience, as a multi-dimensional model, with a dual focus on vulnerability and protective factors, is now recognized as essential in clarifying differences in individual responses to stress (Cederblad, 1996; Werner, 1993).

Attributes of the individual

Individual characteristics of resilience including variables like sociability, intelligence, and communication skills (Olsson *et al.*, 2003) along with personal attributes including positive affect and being empathic and cooperative. Other self-system variables include self-esteem, self-belief, and self-efficacy (Cederblad, 1996). Research has identified variables such as self-mastery, self-esteem, optimism, and positive peer and family relationships as protective factors for resisting depression in adolescence (Dumont and Provost, 1999; Seligman, 1998). The construct of mental toughness or "hardiness", which affords an individual the ability to cope successfully with the day-to-day demands of life, has been shown to be predictive of adolescents' depressive symptoms and life satisfaction, and identified as a positive individual factor that may enhance resilience (Gerber *et al.*, 2013).

Aspects of the family

The family represents an adolescent's primary form of emotional support (Hawley and DeHaan, 1996). Cederblad *et al.* (1994) reported that family resilience

consisted of an adolescent having a trusting relationship with one parent, who is consistent, with similar views and whom provides clear rules. Having positive parent-child relationships, living with both parents and feeling safe at home (Murray *et al.*, 2013), availability of emotional support (Heller *et al.*, 1999), and having a non-blaming parenting style (Luthar, 2006) have all been identified as potential protective factors in mental health.

External environment

External environment refers to an individual outside of the familial origin, who acts as a role model for the adolescent (Beam *et al.*, 2002). For example, perceiving warmth and affection from an external support has been associated with higher self-esteem and fewer depressive symptoms in adolescents (DuBois and Silverthorn, 2005).

The question of why some people face adversity with the ability to surmount its obstacles is compelling to professionals interested in preventing psychosocial problems and in fostering positive functioning among at-risk groups (Feehan *et al.*, 1995). Research to identify protective factors at the personal, familial and external level that can buffer the effects of these risk factors is vital, and resilience research requires reliable and valid measurement scales developed for use in general and clinical populations (Windle *et al.*, 2011). Researchers have been urged to report relevant validation statistics when using measures of resilience (Windle *et al.*, 2011).

Measuring resilience

The Resilience Scale for Adolescents (READ; Hjemdal, 2007) is the only direct measure of resilience that incorporates the three overarching protective factors. The READ was developed in Norway as an adaptation to the Resilience Scale for Adults (RSA; Friborg *et al.*, 2003; Hjemdal *et al.*, 2001). Through the use of exploratory factor analysis (EFA), the 33-item RSA was developed, using an adult sample, covering five factors, namely, Personal Competence (PC), Social Competence (SC), Structured Style (SS), Family Cohesion (FC), and Social Resources (SR). PC relates to an individual's self-esteem, self-efficacy, and overall ability to carry out day-to-day tasks in life. SC measures an individual's extraversion and their ability to engage in good communication and activities with peers. The SS factor accounts for an individual's ability to plan and initiate routine. FC encompasses the shared values and support an individual feels in relation to their family. Finally, SR measures access to external support from friends and relatives as perceived by the individual.

Hjemdal *et al.* (2006) adapted the 33 items from the RSA to adolescents in order to develop the READ scale of adolescent resilience, and items less relevant for adolescents were deleted. This process resulted in 28 positively phrased items in the READ. Given that the READ was developed directly from the RSA, a matching five-factor structure was expected with PC, SC, SS, FC and SR. Hjemdal *et al.* (2006) reported a good model fit for all five factors with confirmatory factor analysis (CFA) and a cross-validation of the measurement model, with high internal consistency for the total READ scale and its subscales. von Soest *et al.* (2010) validated the READ with a large Norwegian sample ($N=7033$) aged 18–20 years. Cronbach's alpha values of PC ($\alpha=0.76$); SC ($\alpha=0.77$); SS ($\alpha=0.69$); FC ($\alpha=0.89$); and SR ($\alpha=0.79$) were reported. Satisfactory construct validity for the five factors of the READ with distress symptoms were reported. The READ was also validated with 307 Norwegian high school students (mean [M] = 16.4 years) (Hjemdal *et al.*, 2011). Total Cronbach's alpha value of $\alpha=0.91$ and subscale values ranging from 0.61 to 0.86 were reported. This study reported small to moderate, significant, negative correlations between resilience and distress symptoms. Stratta *et al.* (2012) validated an Italian version of the READ with 472 adolescents aged 18–20 ($M=18.15$). Similar to previous validations, the total Cronbach's alpha value was $\alpha=0.91$, with no subscale values reported. More recently, a validation of the READ with Mexican adolescents was conducted, confirming support for a five-factor model with a 26-item Spanish version of the READ (Ruvalcaba-Romero *et al.*, 2014).

These studies highlight support for the psychometric properties of the READ, however, there are limitations of these studies which the current research addresses. First, in the initial developmental of the READ (Hjemdal *et al.*, 2006), the initial sample size ($N=425$) was randomly split in two halves, where the first sample was used as an exploratory sample for finding the best fit for each factor, and then the identified measurement model was cross-validated using CFA by testing for model fit on the second half of the sample. Hence, the CFA was conducted on just over 200 participants, which is considered less than adequate in terms of CFA. Jackson (2007) notes that a minimum of 400 participants are needed to detect misspecified models, therefore, the CFA conducted in Hjemdal *et al.* (2006) may have resulted in inaccurate model fits. Second, in the same study, participants in their early adolescence period (age 13–15) took part in the study. Similarly, in von Soest *et al.* (2010), while a larger sample size was used ($N=7033$), the age range of participants was limited (18–20 years). Only one study has

validated the READ with adolescents 12–17 years, however this study used a Spanish translation of the READ and did not test measurement invariance across adolescent subgroups (Ruvalcaba-Romero *et al.*, 2014). Furthermore, the research to date validating the READ has been based primarily on adolescents in Norway, with one study conducted in Italy and one in Mexico. No published study has validated the the original English version of the READ outside of Norway, and hence confirming the validity of the READ in different contexts is important.

The present study

This study examines the psychometric properties of the READ, in a nationally representative sample of adolescents in Ireland. It expands on previous research by investigating the psychometrics of the READ with adolescents, aged 12–18. The primary purpose of this study is to test if the original five-factor structure of the READ as proposed by Hjemdal *et al.* (2006) reproduces well in a new sample. A secondary aim of this study is to test other possible factor structures of the READ including a theory-based three-factor model of resilience and a unidimensional factor model. In line with previous research, the three-factor model of resilience incorporated three overarching themes of resilience: (1) attributes of the individual (including PC and SS); (2) aspects of the family (FC); (3) wider social environment (including SC and SR). This study builds on previous research by examining if the READ measured resilience factors similarly across school cycle, across gender and across distress levels. Internal consistency is evaluated, while *t*-tests are conducted to identify any gender differences for the five READ subscales: PC, SS, FC, SC, SR. Construct validity is also established by correlating the five factors of the READ with various social, psychological and behavioral variables.

Method

Study design and sample

The My World Survey (MWS) is a cross-sectional survey of risk and protective factors of mental health. The MWS – Second Level (MWS-SL) recruited adolescents, aged 12–19 years from a representative sample of the 732 published list of second-level schools in Ireland. A stratified random sample of 171 schools were selected, and a total of 72 schools agreed to participate in the survey. The sampled schools did not depart from the national distribution of schools in terms of gender distribution, disadvantaged status and proportion of schools per health care district.

The final sample included 6085 participants, 55 cases were removed due to missing data, such as gender ($n=28$)

or being over the age of 18 ($n=27$). The remaining sample ($N=6030$) consisted of 3094 females (51.3%) and 2936 males, with participants aged 12–18 years ($M=14.94$). Of the respondents 44.8% were in the Junior school cycle, aged between 12–15, consisting of first, second and third year with the remaining 55.2% in the Senior school cycle, aged between 16–18, including those in the fourth, fifth, and final year of school. Further details of the procedures employed by the MWS-SL study including details on recruitment, and standardized protocol for survey administration in schools are available in a previously published article (Dooley and Fitzgerald, 2013).

Procedure

The original design of the MWS national study, the surveys and procedures for collecting the data were reviewed and approved by the authors Human Research Ethics Committee in December 2010.

Measures

Risk and protective factors were assessed using a battery of psychometrically validated self-report measures along with single-item indicators (Table 1).

Table 1. Single-item indicators included in the My World Survey – Second Level (MWS-SL)

Construct	Question
School year	What school year are you in?
Number of children in household	Number of children in your family including yourself?
Living with both parents	My parents are: (1) married; (2) separated; (3) single; (4) divorced; (5) living together but not married; (6) remarried
Safe neighborhood	How safe do you feel living in your neighborhood
Seen mental health professional	Ever seen a mental health professional?
Cope well with problems	Do you generally cope well with problems?
Anger	Do you feel angry a lot?
Enjoy family life	Do you enjoy family life?
Informal help-seeking	Who would you talk to first if you had problems?
Experience of bullying	Have you been bullied?
Smoked cannabis	Have you ever smoked cannabis?
Trouble with police	Have you ever been in trouble with the police?

Depression, Anxiety and Stress Scale (DASS-21)

The Depression, Anxiety and Stress Scale (DASS-21; Lovibond and Lovibond, 1995) consists of 21 items and assesses symptoms of depression, stress and anxiety, by means of participants rating the frequency and severity of experiencing negative emotions over the previous week. Henry and Crawford (2005) showed the DASS-21 to possess adequate psychometric properties, with high reliabilities and convergent validity. Cronbach's alpha values in the current sample for depression, anxiety and stress were $\alpha=0.88$, 0.80, and 0.83 respectively.

Alcohol Use Disorders Identification Test (AUDIT)

The Alcohol Use Disorders Identification Test (AUDIT), developed by the World Health Organization (Saunders *et al.*, 1993), is a 10-item self-report scale. Typically used as a screening tool for hazardous alcohol consumption (Knight *et al.*, 2002), each of the 10 items are designed to measure three domains, alcohol consumption, signs of alcohol dependence, and alcohol-related harm. In a study comparing alcohol screening tools, with 103 adolescents aged 12–20, Kelly *et al.* (2004) report a Cronbach's alpha value of $\alpha=0.88$, indicating good reliability. The current study also yielded a high alpha value of $\alpha=0.82$.

Rosenberg's Self-Esteem Scale (RSE)

The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) is a 10-item scale, used to assess an individual's overall evaluation of his/her worthiness. Studies with adolescents have shown that the RSE is a valid unidimensional measure of self-esteem (Rosenberg, 1965; Hagborg, 1993). Total scores ranged from 10 to 40, with higher scores indicating higher self-esteem. The current study yielded a Cronbach's alpha value of $\alpha=0.89$.

Life Orientation Test – revised (LOT-R)

The Life Orientation Test – revised (LOT-R), using a five-point Likert scale ranging from “I agree a lot” to “I disagree a lot”, is a reliable measure of dispositional optimism (Palgi *et al.*, 2011, Scheier *et al.*, 1994).

Multidimensional Scale of Perceived Social Support (MSPSS)

The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet *et al.*, 1988) measures perceived social support from (a) family, (b) friends, and (c) an alternative significant other. This 12-item scale allows adolescents to answer on a seven-point Likert scale from “very strongly

agree” to “very strongly disagree”, the extent to which the adolescent feels they have support in each of the three domains. The current study yielded an overall Cronbach’s alpha value of $\alpha = 0.94$.

Behavioral Adjustment Scale (BAS-13)

A shortened 13-item version of the Behavioral Adjustment Scale (BAS-13) was selected for the current study assessing school misconduct and substance misuse (Brown *et al.*, 1986). The scale assesses the frequency of the adolescents own involvement in the behavior over the previous month on a five-point Likert scale ranging from “never” to “almost every day”. Items were slightly adapted for an Irish population, e.g. ‘Police’ changed to ‘Gardaí’. The internal consistency of this shortened scale is adequate yielding a value of $\alpha = 0.86$.

Analyses

Data consisted of participants’ raw scores based on their responses to items in the MWS-SL. Data were screened for missing values and missing data were low, < 1% across the READ variables. The final sample consisted of 6030 participants, following the removal of 55 participants due to missing gender. CFA was performed to assess the factor structure of the READ with the entire sample of 6030. Hypothesized models were specified and estimated using LISREL 8.8 (Jöreskog and Sörbom, 2006a) and model parameters were estimated using maximum likelihood (Jöreskog and Sörbom, 2006b).

Following the guidelines suggested by Hoyle and Panter (1995), the goodness-of-fit for each model was assessed using the chi-square test (Satorra and Bentler, 2001) along with other ancillary indices of global fit. The Goodness-of-Fit Index (GFI; Jöreskog and Sörbom, 1981), based on the proportion of variance accounted for and the Comparative Fit Index (CFI; Bentler, 1990) were utilized in this study, with values greater than 0.90 reflecting an acceptable fit and anything above 0.95 indicating exceptional fit. The root mean square error of approximation (RMSEA; Steiger, 1990), 90% confidence intervals (CIs), are reported with values less than 0.06 indicating a close fit values and values less than 0.05 indicating an excellent fit. The Expected Cross-Validation Index (ECVI; Browne and Cudeck, 1989) and Model Akaike Information Criterion (Model AIC; Akaike, 1987) were used for model comparisons, with the smallest value indicating the best fitting model.

First, separate CFA was conducted for each of the five factors (PC, SC, SS, FC, SR), where models were constructed such that all items for every factor loaded on

one factor. Second, all 28 items were included in a combined model with five inter-correlated resilience factors to test if the original five-factor structure would reproduce well in this new sample. After testing the reproducibility of the original five-factor model, other possible factor structures including a three (individual, family and social cohesion) factor model of resilience, identified in the literature was tested, along with a unidimensional model. Next, multi-group analyses were performed to compare whether the five-factor structure of the READ held similarly for males and females, for those in the Junior and Senior school cycle, and for those scoring highest on symptoms of distress and the rest of the sample. Internal consistency was evaluated using Cronbach’s alpha, while *t*-tests were conducted to examine gender differences for the five factors of the READ, using Cohen’s *d* as the measure of effect (Cohen, 1988). Next, convergent validity was evaluated by correlating the five factors of the READ with various social, psychological and behavioral variables.

Results

Confirmatory factor analysis (CFA)

Using the sample of 6030, separate analyses were conducted for each factor of the READ, where models were constructed such that all items for every factor loaded on one factor. The results of these analyses are presented in Table 2, and show that the fit indices for FC, SR and SS yielded an acceptable fit, with an RMSEA value of below 0.06 for all three. Fit indices for SC and PC, however, showed a less than satisfying model fit with RMSEA values of 0.11 and 0.068, respectively.

The 28 items were then included in a combined model with five inter-correlated resilience factors (see Figure 1). The RMSEA value showed acceptable model fit along with the CFI and GFI indicating that the model fitted well ($\chi^2(340) = 6146.02$, $p < 0.001$, RMSEA = 0.056 [90% CI = 0.054–0.057], CFI = 0.97; GFI = 0.93), hence confirming a five-factor model of resilience.

Next, the five-factor model of the READ was compared to a three-factor model of resilience, as identified in the literature. The three-factor model was designed whereby the Internal Factor remained the same (including SC, PC and SS), but instead of one general External Factor, FC and SR were identified as individual, distinct factors. An adequate fit for this model, was observed ($\chi^2(347) = 8614.02$; $p < 0.001$; CFI = 0.95; GFI = 0.89; RMSEA = 0.068 [90% CI = 0.067, 0.070], however, according to the fit indices, the original five-factor model resulted in the best fit (Table 3).

Table 2. Confirmatory factor analyses for the READ factors ($N=6030$)

Factors	Number of items	df	χ^2	p Value	RMSEA	90% CI	CFI	GFI	AIC	ECVI
Family Cohesion	6	9	157.41	<0.001	0.052	0.045, 0.060	0.99	0.99	181.69	0.030
Social Resources	5	5	11.89	<0.036	0.015	0.0038, 0.027	1	1	32.02	0.0053
Structured Style	4	2	8.62	<0.013	0.023	0.00016, 0.0033	1	1	24.62	0.0041
Social Competence	5	5	377.09	<0.013	0.11	0.11, 0.12	0.96	0.97	420.56	0.07
Personal Competence	8	20	521.96	<0.001	0.068	0.063, 0.073	0.97	0.98	609.92	0.10

Note: df, degrees of freedom; GFI, Goodness-of-Fit Index; CFI, Comparative Fit Index; RMSEA, root mean square error of approximation; CI, confidence interval; ECVI, Expected Cross-Validation Index; AIC, Akaike's Information Criterion.

Figure 1. Factor loadings for the five-factor, 28-item model, $N=6030$.

Table 3. Comparison of original five-factor model, three-factor model and unidimensional model of 28 item READ ($N=6030$)

	df	χ^2	RMSEA	90% CI	CFI	GFI	ECVI
Five-factor model	340	6146.02	0.056	0.054, 0.057	0.97	0.93	1.13
Three-factor model	347	8614.02	0.068	0.067, 0.070	0.95	0.89	1.70
Unidimensional model	350	15556.26	0.10	0.10, 0.10	0.91	0.79	3.85

Note: df, degrees of freedom; GFI, Goodness-of-Fit Index; CFI, Comparative Fit Index; RMSEA, root mean square error of approximation; CI, confidence interval; ECVI, Expected Cross-Validation Index.

The five-factor model was also compared to a unidimensional model (Table 3), whereby all 28 remaining items loaded onto one general resilience factor. The results indicated an inadequate model fit ($\chi^2(350)=15,556.26$; $p<0.001$; CFI=0.91; GFI=0.79; RMSEA=0.10 [90% CI=0.10–0.10]).

Multi-group analyses

Potential gender differences in the measurement model were tested by means of multi-group analysis. A chi-square difference 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 both genders. The results showed there was a significant difference between setting the factor loadings equal or free (corrected χ^2 difference[23] = 158.23, $p<0.001$). However, since the χ^2 value depends on sample size, and a large sample was used in this analyses ($N>6000$), statistically significant gender differences may not be accurate. To investigate further, model fit indices not informed by sample size were compared for the two models with and without restricting the factor loadings to be invariant over gender. The fit-indices for both models were very similar for the CFI=0.96 and the GFI=0.92, while the RMSEA=0.055 (0.054; 0.057) for restricted model and RMSEA=0.056 (0.055; 0.057) for unrestricted model.

Next, differences in model fit were tested between those in the Junior and Senior cycle of school. The results showed small differences between setting the factor loadings equal or allowing them to vary (corrected χ^2 difference [23] = 85.83, $p<0.001$). Again, to investigate further, model fit indices not informed by sample size were compared. The fit indices for both models (restricted and freed) were identical for the CFI (0.96), GFI (0.92), while the RMSEA value was 0.055 (0.054; 0.056) for the restricted model and 0.056 (0.055; 0.057) for the unrestricted model.

Finally, differences in model fit were tested between those who indicated higher levels of distress on the

DASS-21 compared to the rest of the sample. To obtain an accurate measure of differences between those experiencing symptoms of distress, those scoring in the top 90th percentile (10.4%; $n=628$), were compared to the remaining sample. Here, the results showed that setting the factor loadings as equal in both groups resulted in a poorer fit as compared to the model where loadings were allowed to vary freely between the two groups, (corrected χ^2 difference [23] = 269.02, $p<0.001$). However, only small differences in model fit indices, not influenced by sample size, were observed (CFI=0.93 and GFI=0.89 for both models, while RMSEA=0.07 (0.069; 0.071) for restricted model and RMSEA=0.071 [0.069; 0.072] for unrestricted model), suggesting the factor structure were reasonably similar between highest scores on the DASS-21 and the remaining sample.

Reliability analyses

Cronbach's alpha values were computed for all five factors in the 28-item model with a total scale Cronbach's alpha value of $\alpha=0.88$. Individual factor's showed internal reliability as follows: PC, $\alpha=0.77$; SC, $\alpha=0.74$; SS, $\alpha=0.58$; FC, $\alpha=0.86$; SR, $\alpha=0.76$.

Gender differences

Independent *t*-tests were conducted to examine gender differences for the five factors of the READ. Standardized measures of effect for gender differences were observed by calculating the effect size, Cohen's *d* (Cohen, 1988; small=0.2, medium=0.5, and large=0.8). As displayed in Table 4, significant gender differences were observed for the factors PC and SR, with a small effect size observed for SR, and a small-to-medium sized gender difference for PC.

Convergent validity

In order to determine if there were substantial gender differences in the patterns of correlations between the READ factors and other measures, the total sample ($N=6030$)

Table 4. Gender differences on five factors of the 28-item READ for females ($N=3094$) and males ($N=2936$)

	Total Mean (SD)	Females Mean (SD)	Males Mean (SD)	Cohen's d	t
Personal Competence	3.63 (0.65)	3.51 (0.68)	3.76 (0.61)	−0.39	15.11***
Social Cohesion	3.83 (0.70)	3.83 (0.70)	3.83 (0.70)	0	−0.488
Structured Style	3.37 (0.73)	3.35 (0.74)	3.39 (0.73)	−0.05	1.83
Family Cohesion	3.83 (0.80)	3.83 (0.83)	3.84 (0.76)	−0.01	0.76
Social Resources	4.30 (0.62)	4.35 (0.62)	4.24 (0.61)	0.18	−6.99***

Note: SD, standard deviation.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

was split by gender to assess the READ's convergent validity. Pearson's correlation analyses were undertaken to investigate the convergent validity of the five factors of the READ with various social, psychological and behavioral variables. The results of these analyses are presented in Tables 5 and 6.

Tables 5 and 6 show that there were gender differences in the patterns of correlations observed between the five READ factors and social, psychological and behavioral variables. The inter-correlations between the five factors of the READ ranged between $r=0.37$ and $r=0.62$ for males and between $r=0.32$ and $r=0.59$ for females. Similar to von Soest *et al.* (2010), the inter-correlations between the five factors of the READ were slightly lower for females than males. The correlations observed for all five factors of the READ confirm that the factors are inter-connected however they are still distinct constructs. As can be seen in Tables 5 and 6, the five resilience factors showed small negative correlations with demographic variables such as living with both parents and number of children living in household. As expected, all five factors of the READ showed significant negative correlations with distress symptoms, for both males and females. The correlations between the READ factors and behavioral variables such as being in trouble with the Gardaí and having smoked cannabis were small.

Discussion

The current study examined the validity of the READ with a representative sample of adolescents in Ireland. The results supported the factor structure, psychometric properties, and validity of the original 28-item version of the READ to assess resilience factors in adolescents in Ireland aged 12–18 years. The original five-factor structure of the READ reproduced well in an Irish sample of adolescents. This is an important advance in the resilience literature

as most of the research has been conducted in Norway and no study has validated the original English version of the READ outside of Norway.

This finding is similar to previous research on the READ (Ruvalcaba-Romero *et al.*, 2014; von Soest *et al.*, 2010), whereby the five-factor structure of the READ generally showed an acceptable model fit. Through multi-group analysis, the current study showed that the five-factor model was similar between males and females, younger and older adolescents, and broadly similar among those with varying distress levels. This adds to the literature in the area by enabling researchers to confidently assess protective factors associated with resilience among subgroups of adolescents.

Additional models of resilience were also tested including a three-factor theoretical model and a unidimensional model. While the three-factor model yielded an adequate fit, the five-factor model provided a more satisfactory fit, hence confirming it as the best fitting model of resilience for adolescents in Ireland. The unidimensional model was a poor fit to the data.

Internal consistency analyses provided evidence for acceptable reliability of the READ subscales with the exception of SS. Other studies have also shown that SS, which taps into the level of preference in which an adolescent plans and structures his/her daily routine, has a less than acceptable alpha value (von Soest *et al.*, 2010; Ruvalcaba-Romero *et al.*, 2014). Through qualitative research with adolescents, other important aspects of SS may be identified or these items could be refined, which may increase the reliability of this factor.

Gender differences observed in this study are in line with previous studies. Males reported significantly higher levels of PC, while females reported high levels of SR. Males report feeling more competent personally, while women report being more socially skilled in accessing social supports and resources (Hjemdal *et al.*, 2006; Ruvalcaba-Romero *et al.*,

Table 5. Correlations of the READ subscales for females ($N=3094$)

	Personal Competence	Social Competence	Structured Style	Family Cohesion	Social Resources
READ-Personal Competence					
READ-Social Competence	0.52**				
READ-Structured Style	0.59**	0.32**			
READ-Family Cohesion	0.56**	0.35**	0.48**		
READ-Social Resources	0.52**	0.45**	0.37**	0.59**	
Age	-0.15**	-0.12**	-0.11**	-0.13**	-0.11**
School year	-0.15**	-0.11**	-0.11**	-0.13**	-0.10**
Safe neighborhood	0.22**	0.13**	0.15**	0.25**	0.23**
Living with both parents	-0.05**	-0.002	-0.05**	-0.13**	-0.08**
Number of children in household	-0.02	-0.04*	-0.05**	-0.06**	-0.03*
Cope well with problems	0.41**	0.20**	0.23**	0.30**	0.26**
RSE	0.65**	0.32**	0.40**	0.48**	0.42**
LOT-R	0.66**	0.28**	0.36**	0.45**	0.38**
DASS-21	-0.46**	-0.20**	-0.25**	-0.41**	-0.37**
Depression	-0.48**	-0.21**	-0.27**	-0.40**	-0.37**
Stress	-0.38**	-0.17**	-0.21**	-0.36**	-0.30**
Anxiety	-0.34**	-0.14**	-0.18**	-0.33**	-0.29**
Seen mental health professional	-0.19**	-0.06**	-0.11**	-0.19**	-0.15**
Anger	-0.36**	-0.15**	-0.21**	-0.38**	-0.29**
MSPSS	0.29**	0.21**	0.21**	0.45**	0.47**
Enjoy family life	0.37**	0.16**	0.28**	0.62**	0.37**
Informal help-seeking	0.35**	0.23**	0.22**	0.38**	0.46**
Experience of bullying	-0.14**	-0.05**	-0.07**	-0.14**	-0.15**
BAS-13	-0.31**	0.012	-0.30**	-0.34**	-0.18**
AUDIT	-0.26**	0.01	-0.24**	-0.29**	-0.17**
Smoked cannabis	-0.16**	-0.01**	-0.15**	-0.21**	-0.11**
Trouble with police	-0.16**	0.03	-0.14**	-0.18**	-0.13**

Note: Statistics highlighted in bold indicate correlations that were a priori expected to be strong.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

2014; von Soest *et al.*, 2010). These findings are insightful for adolescent mental health as they specify resilience factors that need to be enhanced for males and females.

Finally, convergent and divergent validity of the READ highlighted correlations between the five factors of the READ and social, psychological and behavioral variables. As expected, all five factors of the READ showed significant negative correlations with depressive symptoms, anxiety and stress. This indicates how the READ may be a predictor of mental distress (Hjemdal *et al.*, 2007). There is also the possibility that those who experience a negative mood or severe symptoms of anxiety exhibit decreased levels of resilience (Kendall and Suveg, 2006). The current study expands the research area by correlating the READ factors with other variables not previously identified. For

example, coping well with problems was shown to be correlated with all five factors of the READ. Perceived social support was correlated with all factors of the READ, but higher correlations were seen for FC and SR, highlighting the family and social environment as essential to an adolescents' ability to overcome challenges. Optimism was also highly correlated with PC, suggesting that variables like self-esteem and self-efficacy are important for a positive outlook on life. Feeling angry a lot was more highly correlated with FC and PC indicating the importance of the family context and self in the development of emotional regulation. Similar to von Soest *et al.* (2010), smoking cannabis and drinking alcohol yielded small correlations with the READ factors, with the highest correlation seen for FC.

Table 6. Correlations of the READ subscales for males ($N=2936$)

	Personal Competence	Social Competence	Structured Style	Family Cohesion	Social Resources
READ-Personal Competence					
READ-Social Competence	0.56**				
READ-Structured Style	0.53**	0.37**			
READ-Family Cohesion	0.53**	0.39**	0.50**		
READ-Social Resources	0.49**	0.48**	0.41**	0.62**	
Age	-0.10**	-0.07**	-0.16**	-0.20**	-0.12**
School year	-0.09**	-0.05*	-0.16**	-0.19**	-0.10**
Safe neighborhood	0.19**	0.10**	0.11**	0.21**	0.18**
Living with both parents	-0.06**	0.02	-0.05*	-0.09**	-0.08**
Number of children in household	0.01	0.05**	0.02	-0.02	-0.03
Cope well with problems	0.36**	0.21**	0.19**	0.22**	0.21**
RSE	0.59**	0.36**	0.32**	0.43**	0.44**
LOT-R	0.53**	0.29**	0.28**	0.37**	0.36**
DASS-21	-0.35**	-0.18**	-0.20**	-0.33**	-0.26**
Depression	-0.40**	-0.20**	-0.21**	-0.33**	-0.26**
Stress	-0.30**	-0.16**	-0.18**	-0.30**	-0.21**
Anxiety	-0.26**	-0.11**	-0.13**	-0.26**	-0.21**
Seen mental health professional	-0.10**	-0.03	-0.06**	-0.10**	-0.08**
Anger	-0.27**	-0.13**	-0.17**	-0.29**	-0.21**
MSPSS	0.20**	0.17**	0.17**	0.36**	0.40**
Enjoy family life	.33**	.17**	.27**	.56**	.37**
Informal help-seeking	.29**	.22**	.22**	.33**	.40**
Experience of bullying	-0.12**	-0.09**	-0.05**	-0.09**	-0.08**
BAS-13	-0.17**	.05**	-0.18**	-0.27**	-0.14**
AUDIT	-0.15**	.03**	-0.16**	-0.25**	-0.13**
Smoked cannabis	-0.11**	.001	-0.13**	-0.20**	-0.13**
Trouble with police	-0.05	.08**	-0.07**	-0.16**	-0.10**

Note: Statistics highlighted in bold indicate correlations that were a priori expected to be strong.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$.

In conclusion, the READ factors for all measures tested were broadly similar for males and females, this further provides support for the findings which showed the READ to be applicable across gender and hence confirms the convergent validity of the scale. In addition, results showed the READ factors correlate better with psychological outcomes as opposed to behavioral outcomes, highlighting the importance of this scale to understanding psychological functioning.

Strengths and limitations

The current study was the first validation of the READ among a large representative sample of adolescents in Ireland from 12 to 18 years old. A strength was the use of

psychometrically validated measures, including an internationally recognized measure of distress, DASS-21, to investigate inter-correlations between variables and the READ factors. This study was also the first to assess differences in factor structure of the READ across Junior and Senior school cycle. The results from this study, along with previous research, suggest that resilience is an important indicator of mental health in adolescents. The READ is an important tool that can be used in the prevention and intervention of mental distress in adolescents as it assesses several factors with few items. The READ could also be used as a tool for identifying the strengths and weaknesses of a young person with regard to their resilience levels. This could then create a focus for development for the young person.

With regard to limitations, this study was conducted with a random sample of school-going adolescents and generalizability of the results to other countries is unknown. Secondly, the use of self-report measures means that findings may have been influenced by social desirability. Future research validating the READ is warranted to determine if a five-factor solution is a good fit in various cultural contexts. Finally, no test–retest estimates are available as participants were assessed only once.

Conclusion and future research

In conclusion, the present study provides support for the psychometric properties of the READ as a quick, valid and reliable tool, which has potential to identify psychological outcomes in adolescents. The 28-item READ has been empirically demonstrated to assess five relatively distinct constructs of resilience, comprising of the three theoretically founded over-arching themes of resilience (Masten and Garmezy, 1985). The applicability of the READ with various subgroups among adolescents in Ireland is a key finding in this study which results in the use of the READ with a wide range of adolescents. The

READ provides exciting opportunities in the area of mental health as a tool that can predict levels of distress in adolescents. Future research could investigate the utility of the READ with a sample of adolescents that have successfully adapted to stress, and qualitative research with adolescents could shed some light on the reasons for the low reliability of the SS subscale. Notwithstanding the need for future research in this area, it is concluded that the READ is a valid and reliable measure for assessing resilience in adolescents, in Ireland.

Acknowledgement

The authors would like to acknowledge funding for this research from the One Foundation in Ireland. The authors also thank the adolescents who participated in this study, their parents who gave permission and the schools who provided the time and space to facilitate data collection. The authors also gratefully acknowledge the research assistants who facilitated with data collection and data entry.

Declaration of interest statement

The authors have no competing interests.

References

- Akaike H. (1987) Factor analysis and AIC. *Psychometrika*, **52**(3), 317–332.
- Beam M.R., Chen C., Greenberger E. (2002) The nature of adolescents' relationships with their "very important" non-parental adults. *American Journal of Community Psychology*, **30**(2), 305–325. DOI:10.1023/A:1014641213440.
- Bentler P.M. (1990) Comparative fit indexes in structural models. *Psychological Bulletin*, **107**(2), 238–246.
- Brown B.B., Clasen D.R., Eicher S.A. (1986) Perceptions of peer pressure, peer conformity dispositions, and self-reported behaviour among adolescents. *Developmental Psychology*, **22**(4), 521–553. DOI:10.1037/0012-1649.22.4.521.
- Browne M.W., Cudeck R. (1989) Single sample cross-validation indices for covariation structures. *Multivariate Behavioral Research*, **24**(4), 445–455.
- Cederblad M. (1996) Fifty years of epidemiologic studies in child and adolescent psychiatry in Sweden. *Nordic Journal of Psychiatry*, **50**(36), 55–66. DOI:10.3109/08039489609104315.
- Cederblad M., Dahlin L., Hagnell O., Hansson K. (1994) Salutogenic childhood factors reported by middle-aged individuals: follow up of the children from the Lundby study grown up in families experiencing three or more childhood psychiatric risk factors. *European Archives of Psychiatry and Clinical Neuroscience*, **244**(1), 1–11. DOI:10.1007/BF02279805.
- Dooley B., Fitzgerald A. (2013) Methodology on the My World Survey (MWS): a unique window into the world of adolescents. *Early Intervention in Psychiatry*, **7**(1), 12–22. DOI:10.1111/j.1751-7893.2012.00386.x.
- DuBois D.L., Silverthorn N. (2005) Characteristics of natural mentoring relationships and adolescent adjustment: evidence from a national study. *Journal of Primary Prevention*, **26**(2), 69–92. DOI:10.1007/s10935-005-1832-4.
- Dumont M., Provost M.A. (1999) Resilience in adolescents: protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. *Journal of Youth and Adolescents*, **28**(3), 343–363. DOI:10.1023/A:1021637011732.
- Feehan M., McGee R., Williams S.M., Nada-Raja S. (1995) Models of adolescent psychopathology: childhood risk and the transition to adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry*, **34**(5), 670–679. DOI:10.1097/00004583-199505000-00019.
- Fergus S., Zimmerman M.A. (2005) Adolescent resilience: a framework for understanding healthy development in the face of risk. *Annual Review Public Health*, **26**(1), 399–419. DOI:10.1146/annurev.publhealth.26.021304.144357.
- Friborg O., Hjemdal O., Rosenvinge J.H., Martinussen M. (2003) A new rating scale for adult resilience: what are the central protective resources behind healthy adjustment? *International Journal of Methods in Psychiatric Research*, **12**(2), 65–76. DOI:10.1002/mpr.143.
- Gerber M., Brand S., Feldmeth A.K., Land C., Elliot C., Holsboer-Trachsler E., Pöhsle U. (2013) Adolescents with high mental toughness adapt better to perceived stress: a longitudinal study with Swiss vocational students. *Personality and Individual Differences*, **54**(7), 800–814. DOI:10.1016/j.paid.2012.12.003.
- Hagborg W.J. (1993) The Rosenberg self-esteem scale and Harter's self-perception profile for adolescents: a concurrent validity study. *Psychology in the Schools*, **30**(2), 132–136.
- Hawley D.R., DeHaan L. (1996) Toward a definition of family resilience: integrating life-span and family perspectives. *Family Process*, **35**(3), 283–298. DOI:10.1111/j.1545-5300.1996.00283.x.
- Heller S.S., Larrieu J.A., d'Imperio R., Boris N.W. (1999) Research on resilience to child maltreatment: empirical considerations. *Child Abuse & Neglect*, **23**(4), 321–338. DOI:10.1016/S0145-2134(99)00007-1.

- Henry J.D., Crawford J.R. (2005) The short-form version of the Depression Anxiety Stress Scales (DASS-21): construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, **44**(part 2), 227–239. DOI:10.1348/014466505X29657.
- Hjemdal O. (2007) Measuring protective factors: the development of two resilience scales in Norway. *Child and Adolescent Psychiatric Clinics of North America*, **16**(2), 303–321. DOI:10.1016/j.chc.2006.12.003.
- Hjemdal O., Aune T., Reinfjell T., Stiles T.C., Friborg O. (2007) Resilience as a predictor of depressive symptoms: a correlational study with young adolescents. *Clinical Child Psychology and Psychiatry*, **12**(1), 91–104. DOI:10.1177/1359104507071062.
- Hjemdal O., Friborg O., Martinussen M., Rosenvinge J.H. (2001) Preliminary results from the development and validation of a Norwegian scale for measuring adult resilience. *Journal of the Norwegian Psychological Association*, **38**(4), 310–317.
- Hjemdal O., Friborg O., Stiles T.C., Martinussen M., Rosenvinge J.H. (2006) A new scale for adolescent resilience: grasping the central protective resources behind healthy development. *Measurement and Evaluation in Counseling and Development*, **39**(2), 84–96.
- Hjemdal O., Vogel P.A., Solem S., Hagan K., Stiles T.C. (2011) The relationship between resilience and levels of anxiety, depression and obsessive-compulsive symptoms in adolescents. *Clinical Psychology and Psychotherapy*, **18**(4), 314–321. DOI:10.1002/cpp.719.
- Hoyle R.H., Panter A.T. (1995) Writing about structural equation models. In Hoyle R.H. (ed) *Structural Equation Modelling: Concepts, Issues, and Applications*, pp. 158–176, Thousand Oaks, CA: Sage Publications.
- Jackson D.L. (2007) The effect of the number of observations per parameter in misspecified confirmatory factor analytic models. *Structural Equation Modeling: A Multidisciplinary Journal*, **14**(1), 48–76.
- Jöreskog K.G., Sörbom D. (1981) LISREL V: Analysis of Linear Structural Relationships by Method of Maximum Likelihood, Chicago, IL: National Educational Resources.
- Jöreskog K.G., Sörbom D. (2006a) LISREL 8 (version 8.8), Chicago, IL: Scientific Software International Inc.
- Jöreskog K.G., Sörbom D. (2006b) PRELIS 2 (version 2.8), Chicago, IL: Scientific Software International Inc.
- Kelly T.M., Donovan J.E., Chung T., Cook R.L., Delbridge T.R. (2004) Alcohol use disorders among emergency department-treated older adolescents: a new brief screen (RUFT-Cut) using the AUDIT, CAGE, CRAFFT, and RAPS-QF. *Alcoholism: Clinical and Experimental Research*, **28**(5), 746–753.
- Kendall P.C., Suveg C. (2006) Treating anxiety disorders in youth. In Kendall P.C. (ed) *Child and Adolescent Therapy*, pp. 243–296, New York: The Guildford Press.
- Knight J.R., Sherritt L., Shrier L.A., Harris S.K., Chang G. (2002) Validity of the CRAFFT substance abuse screening test among adolescent clinic patients. *Archives of Paediatric Adolescent Medicine*, **156**(6), 607–614. DOI:10.1001/archpedi.156.6.607.
- Kraemer H.C., Kazdin A.E., Offord D.R., Kessler R.C., Jensen P.S., Kupfer D.J. (1997) Coming to terms with the terms of risk. *Archives of General Psychiatry*, **54**(4), 337–343.
- Lovibond S.H., Lovibond P.F. (1995) *Manual for the Depression, Anxiety, and Stress Syndromes*, Sydney: Psychology Foundation.
- Luthar S.S. (2006) Resilience in development: A synthesis of research across five decades. In *Developmental Psychopathology: Risk, Disorder, and Adaptation*, pp. 740–795, New York: Wiley.
- Masten A.S., Garmezy N. (1985) Risk, vulnerability, and protective factors in the developmental psychopathology. In Lahey B.B., Kazdin A.E. (eds) *Advances in Clinical Child Psychology*, Vol. **8**, pp. 1–51, New York: Plenum.
- Murray K.W., Dwyer K.M., Rubin K.H., Knighton-Wisor S., Booth-LaForce C. (2013) Parent–child relationships, parental psychological control, and aggression: maternal and paternal relationships. *Journal of Youth and Adolescence*, **43**(8), 1361–1373. DOI:10.1007/s10964-013-0019-1.
- Olsson C.A., Bond L., Burns J.M., Vella-Brodick D.A., Sawyer S.M. (2003) Adolescent resilience: a concept analysis. *Journal of Adolescence*, **26**(1), 1–11. DOI:10.1016/S0140-1971(02)00118-5.
- Palgi Y., Shrira A., Ben-Ezra M., Cohen-Fridel S., Bodner E. (2011) The relationships between daily optimism, daily pessimism, and affect in young and old age. *Personality and Individual Differences*, **50**(8), 1294–1299. DOI:10.1016/j.paid.2011.02.030.
- Rosenberg M. (1965) *Society and the Adolescent Self*, Princeton, NJ: Princeton University Press.
- Rutter M., Maughan M., Mortimore P., Ouston J. (1979) *Fifteen Thousand Hours*, Cambridge, MA: Harvard University Press.
- Ruvalcaba-Romero N.A., Gallegos-Guajardo J., Villegas-Guinea D. (2014) Validation of the Resilience Scale for Adolescents (READ) in Mexico. *Journal of Behavior, Health & Social Issues*, **6**(2), 21–34. DOI:10.5460/jbhsi.v6.2.41180.
- Satorra A., Bentler P.M. (2001) A scaled difference chi-square test statistic for moment structure analysis. *Psychometrics*, **66**(4), 507–514. DOI:10.1007/BF02296192.
- Saunders J.B., Aasland O.G., Babor T.F., de la Fuente J.R., Grant M. (1993) Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption. *Addiction*, **88**(6), 791–804.
- Scheier M.F., Carver C.S., Bridges M.W. (1994) Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem) – a reevaluation of the life orientation test. *Journal of Personality and Social Psychology*, **67**(6), 1063–1078.
- Seligman M.E.P. (1998) The prediction and prevention of depression. In Routh D.K., DeRubeis R.J., Robert J. (eds) *The Science of Clinical Psychology: The Science of Accomplishments and Future Directions*, pp. 201–214, Washington, DC: American Psychological Association.
- Steiger J.H. (1990) Structural model evaluation and modification: an interval estimation approach. *Multivariate Behavioral Research*, **25**(2), 173–180. DOI:10.1207/s15327906mbr2502_4.
- Stratta P., Riccardi I., Di Cosimo A., Cavicchio A., Struglia F., Daneluzzo E. *et al.* (2012) A validation study of the Italian version of the resilience scale for adolescents (READ). *Journal of Community Psychology*, **40**(4), 479–485. DOI:10.1002/jcop.20518.
- von Soest T., Mossige S., Stefansen K., Hjemdal O. (2010) A validation of the resilience scale for adolescents (READ). *Journal of Psychopathological Behavioural Assessment*, **32**(2), 215–225. DOI:10.1007/s10862-009-9149-x.
- Wells R.D., Schwebel A.I. (1987) Chronically ill children and their mothers: predictors of resilience/vulnerability to hospital and surgical stress. *Journal of Developmental and Behavioural Paediatrics*, **8**(2), 82–89.
- Werner E.E. (1993) Risk, resilience and recovery: perspectives from the Kauai longitudinal study. *Development and Psychopathology*, **5**(4), 503–515.
- Werner E.E., Bierman J.M., French F.E. (1971) *The Children of Kauai: A Longitudinal Study from*

- the Prenatal Period to Age Ten, Honolulu, HI: University of Hawaii Press.
- Werner E.E., Smith R.S. (1982) *Vulnerable but Invincible. A Longitudinal Study of Resilient Children and Youth*, New York: McGraw-Hill.
- Werner E.E., Smith R.S. (2001) *Journeys from Childhood to Midlife: Risk, Resilience, and Recovery*, Ithaca, NY: Cornell University Press.
- Windle G., Bennett K.M., Noyes J. (2011) A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes*, 9(1), 8. DOI:10.1186/1477-7525-9-8.
- Zimet G.D., Dahlem N.W., Zimet S.G., Farley G.K. (1988) The multidimensional scale of perceived social support. *Journal of Personality Assessment*, 52(1), 30–41. DOI:10.1080/00223891.1990.9674095.