

Development and Aging

Adolescent stress: Evaluation of the factor structure of the Adolescent Stress Questionnaire (ASQ-N)

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The present study reports an evaluation of the factor structure of the Norwegian version of the Adolescent Stress Questionnaire (ASQ-N) among 723 students. Principal components analysis (PCA) revealed nine internally consistent dimensions of adolescent stress. Scales constructed from this PCA correlated positively with measures of depression and anxiety and negatively with self-esteem. Girls reported higher stress levels than boys in seven of the nine scales and age was also positively correlated with the scale scores of adolescent stress. The results revealed that the instrument has potential for measuring adolescent stress. The stability of the ASQ-N needs to be tested repeatedly, across cohorts and over time, to establish the adequacy for use in Norwegian adolescent studies.

Key words: Stress measurement, psychometrics, psychological patterns, adolescents, stress assessment.

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INTRODUCTION

The experience of adolescent stress constitutes an issue of central importance to the understanding of adolescent health (Grant, Compas, Stuhlmacher, Thurm, McMahon & Halpert, 2003). The collection of systematic information on this issue is therefore central to the planning of primary health care and educational services for this age group. Thus, the availability of reliable instruments to provide us with this information is a self-evident necessity.

Adolescence is a developmental period characterized by changes in virtually every aspect of an individual's life, and calling for new psychological adaptations (Byrne, Davenport & Mazanov, 2007). Stressful life events (hereafter referred to as stressors) derive both from normative experiences of development (e.g. developmental challenges such as puberty, school transitions, increased academic demands), non-normative stressful life events (e.g. divorce, moving to a new place), and daily hassles (e.g. peer group pressure, parent-child conflict) (Suldo, Shaunessy & Hardesty, 2008). The experience of stress is highly individual-specific; it is evident in different intensities and for different durations within the age group. So, despite recent reviews suggesting that transactional definitions of stress involving cognitive appraisal processes may be problematic due to shifts in cognitive capacity during childhood and early adolescence (Grant *et al.*, 2003; Grant, Compas, Thurm, McMahon & Gipson, 2004), there is agreement that it is not the experience of stress *per se* that is harmful, but rather the adolescents' lack of individual and environmental resources to allow them to cope adequately with various stressors that produces the documented negative impact on adolescent health and well-being (Murberg & Bru, 2005; Oppedal &

Røysamb, 2004). It is therefore important to consider the context in which stress is experienced (Plunkett, Radmacher & Moll-Phanara, 2000).

In the present paper we have employed a recently used definition of stress: "...the condition that results when person/environment transactions lead the individual to perceive a discrepancy between the demands of a situation and the resources of the person's biological, psychological and social systems" (Caltabiano, Sarafino & Byrne, 2008, p. 128).

Adolescence is typically a period where most individuals are in relatively good health with few reports of physical illness, but there is some evidence that increases in stressor exposure accounts, at least in part, for increased rates of psychological problems among adolescents (McMahon, Grant, Compas, Thurm & Ey, 2003). In this regard, girls appear to be more vulnerable to stress than boys (Jose & Ratcliffe, 2004; Rudolph, 2002). Research has revealed that high levels of experienced stress are associated with psychosomatic problems (Eriksen & Ursin, 2004; Seiffge-Krenke, 2000) and stress has also been implicated in the rising incidence of such serious psychological symptoms as depression (Waaktaar, Borge Helmen, Fundingsrud, Christie & Torgersen, 2004), anxiety (Byrne *et al.*, 2007; Rudolph, 2002), nervousness and irritability (Natvig, Albrektsen, Anderssen & Qvarnström, 1999).

The assessment of stress in adolescence demands a valid and reliable instrument (Grant *et al.*, 2004). The most widely used method for assessing stressors affecting adolescents is the self-report checklist (Grant *et al.*, 2004) where respondents are presented with lists or inventories of stressful events that are representative of both common and more extreme experiences in adolescence (Grant *et al.*, 2004, for a review). A number of

significant methodological (and theoretical) criticisms can be raised in regard to general checklists of stressor experience. Some scales have been derived from measures of adult stressors modified for adolescent populations (e.g. Coddington, 1971; Newcomb, Huba & Bentler, 1981; Swearingen & Cohen, 1985), so failing to fully address the uniqueness of adolescent stressors. Others have been constructed with a focus on researchers' particular interests in regard to the consequences of stress, so limiting the number and types of stressful events that may be examined (Bagley, 1993; Burnett & Fanshawe, 1997; Grant *et al.*, 2004). Byrne *et al.* (2007) in proposing a new measure of adolescent stress, have discussed these issues in detail, and they need not be further discussed here. They argued, however, that a new measure was required which paid full attention to the uniqueness of adolescent stressors, with items presented for response in a language fully matched to the current adolescent vernacular – an issue frequently missed by existing measures.

The Adolescent Stress Questionnaire (ASQ) (Byrne *et al.*, 2007) was developed to address these methodological issues. The ASQ is an instrument made up of items designed to measure common stressors that adolescents may experience in their daily lives. It also allows adolescents to report the extent to which any recent stressor experience has constituted a psychological challenge for them. The scale has been in use since the beginning of the 1990s and was recently extensively revised, with new item content (and language) derived from focus group methodology (led by a clinical psychologist), asking adolescents themselves about the nature of common stressors that they might experience in the course of their daily lives. The instrument has been extensively psychometrically redeveloped and offers both a valid and reliable way of assessing adolescent stress in both research and clinical contexts (Byrne *et al.*, 2007).

METHOD

Participants

The participants in the study were 723 students from public elementary and secondary schools from both rural and urban areas in the county of Trøndelag in Mid-Norway (352 boys and 362 girls, 9 missing responses to the gender question), with ages ranging from 13–18 years. The mean age of the Norwegian participants was 15.59 for boys ($SD = 1.41$) and 16.00 years for girls ($SD = 1.63$). Boys and girls did not differ significantly regarding age.

Procedure

The study was approved by the Norwegian Social Science Data Services (NSD), with consent from the municipalities and the schools. Passive consent from the participants was allowed because no personal data was collected. After permission from the schools, adolescents received an information letter which briefly explained the purpose of the study. The participants were assured that their responses were completely confidential, that their participation was voluntarily and that they could withdraw from the study without question. The questionnaire administration was completed in whole class groups at a specified hour of the school day where teachers could supervise the administration. The data were collected during September and October 2005.

Measures

In addition to completing the below described scales, all the participants completed a questionnaire containing basic demographic information (age and gender):

Adolescent stressor experience using the 58 item ASQ-N. The adolescents were asked to indicate how stressful each of the experiences or situations reported in the items had been during the last year. Each stressor item was rated on a five-point Likert scale where the respondents self-reported individual stressor appraisal: 1 = not at all stressful (or is irrelevant to me), 2 = a little stressful, 3 = moderately stressful, 4 = quite stressful, and 5 = very stressful. The use of an item score of 1 to reflect either that an item had been encountered but had resulted in the experience of no self-reported stress at all, or that an item had not been encountered (and so by implication had not resulted in the experience of stress), may appear superficially to indicate two different phenomena. However, since any item score effectively reflects the level of self-reported stress (ranging from 1 to 5), it is immaterial whether a score of 1 indicates that an item has occurred but has resulted in no self-reported stress, or that no self-reported stress is evident because the item has not occurred; to all intents and purposes, the phenomenon being assessed is identical in both cases. This was the reasoning used in the original (Australian) study and to ensure consistency, it is the convention which has been adopted for use with the Norwegian sample. The latest Australian version of the ASQ resulted in a set of 10 factors of adolescent stress reflecting stress of home life, school performance, school attendance, romantic relationships, peer pressure, teacher interaction, future uncertainty, school/leisure conflict, financial pressure and emerging adult responsibility (Byrne *et al.*, 2007). Internal consistencies of the Australian ASQ scales were examined using Cronbach's alpha coefficients. These ranged from 0.62 (Stress of emerging adult responsibility) to 0.92 (Stress of home life) with 8 of the 10 scales having internal reliabilities above 0.80. Scale test-retest correlations over a single week time period ranged between 0.68 (Stress of financial pressure) and 0.88 (Stress of home life). Three criterion measures (anxiety, depression and self-esteem) were used to test for concurrent criterion validity of the ASQ. These measures correlated modestly to strongly and in the expected directions with one another (positively with measures of depression and anxiety and negatively with self-esteem) (Byrne *et al.*, 2007).

Translation of the ASQ to the ASQ-N. The translation of the ASQ from Australian English to Norwegian was accomplished with reference to Cull *et al.*'s (2002) four-step translation procedure. The questionnaire was first translated from English to Norwegian by three independent bilingual, native Norwegian translators. The three versions were then compared and differences were corrected to find the most appropriate words, expressions and sentence structure to capture the meaning of the items. Two other translators, who had not seen the original version of the ASQ, did the back-translation from Norwegian back to English. Both translators were bilingual; one was native Norwegian and the other a native English speaker. The original and back-translated versions of the questionnaire were compared to ensure that the forward translation was as precise and complete as possible with reference to semantic and conceptual equivalence. The provisional forward translation of the Norwegian version of the ASQ was then pilot-tested before use on the larger sample.

The following instruments were chosen as validation constructs, as in the study of Byrne *et al.*, (2007):

State anxiety was measured using the Spielberger State-Trait Anxiety Inventory (Spielberger, 1983), a 20-item questionnaire measuring level of state (current) anxiety, scored on a four-point Likert scale ranging from (1) not at all to (4) very much so. Examples of some items are: "I feel secure", "I feel satisfied" "I am tense". The STAI has been used extensively in adolescent populations (Barnes, Harp & Jung, 2002; Hishinuma, Miyamoto, Nishimura *et al.*, 2000) and adolescent stress and anxiety is found to be related in the research literature (Jose & Ratcliffe, 2004; Rudolph, 2002). Internal consistency is high ranging from 0.83 to 0.92 (Spielberger, 1983) and the Norwegian version has also shown high

internal consistency as the original version (Haseeth, Hagtvet & Spielberger, 1990). Cronbach's alpha coefficient for the present study was 0.98.

State depression. The scale consists of a non-clinical depression scale with 15 items measuring respondents' level of current depressive mood using symptoms outlined in the Diagnostic and Statistical Manual - fourth edition TR (DSM: American Psychiatric Association, 2000) and the Zung Self Rating Depression Scale (Zung, 1965) (see Byrne *et al.*, 2007). The scale was constructed by Byrne *et al.* (2007) for the purposes of validation of the stress instrument and psychometric information on the scale prior to that study of the instrument is therefore not available. The scale is measured on a five-point Likert scale ranging from 0 – never to 4 – always. Some item examples are: "I have felt sad or unhappy", "I feel like crying", "I have felt like I have failed". Cronbach's alpha coefficient for the present study was 0.96.

Self-esteem was measured using the Rosenberg Self-Esteem Scale (RSE: Rosenberg, 1965), a 10-item questionnaire measuring global self-esteem on a four-point Likert scale, ranging from 0 – strongly disagree to 3 – strongly agree. The scale measures global self-esteem with high scores indicating high levels of global self-esteem. It is found to be a reliable (Cronbach's alpha coefficient 0.92) (Heatherton & Wyland, 2003) and valid measure for global self-esteem through all ages, including adolescence (Chiu, 1988); Gray-Little, Williams & Hancock, 1997). The scale has been used in Norwegian studies (e.g. Dieserud, Røysamb, Ekeberg & Kraft, 2001), with internal consistency varying from 0.80–0.88). Cronbach's alpha coefficient for the present study was 0.94.

Statistical analysis

All the statistical analyses were carried out using the Statistical Package for Social Sciences SPSS, version 14.0 (SPSS Inc., Chicago, IL). The response rate on the ASQ-N data showed $n = 179$ cases (24.8%) had missing data, with $n = 114$ (15.8%) missing only one or two responses across the 58 items. Missing data seemed to be random across the scale items, where the highest missing data was on item 10 (6.4%), followed by item 27 (6.1%), item 40 (5.9%) and item 5.2 (5.9%). The other items had missing item rates ranging between 0.4% and 3.5%. Missing item rates were non-significant between genders and did not differ significantly with age.

Principal Components Analysis (PCA). The 58 items were subjected to an exploratory principal components analysis (PCA) with oblimin rotation based on arguments and results in studies of Byrne *et al.* (2007) and Mazanov and Byrne (2006). Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Olkin value exceeded the recommended value of 0.6 and Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. Internal reliabilities (Cronbach's alpha coefficient) were also calculated for all subscales. Gender differences on the stress scales were tested using independent samples *t*-tests (two-tailed) and correlation was used to test the relation between ASQ-N and age, and measures of depression, anxiety and self-esteem (Byrne *et al.*, 2007).

RESULTS

Table 1 presents the results from the PCA with item number loading onto Norwegian factors, and the variance associated with each dimension. Five items did not load on any of the factors (loading < 0.30) (item 10, 11, 15, 18, 20, 43) and were excluded from the factors and scale scores. The factor structure also showed that ten items had cross loadings. This will be discussed later. The final factor solution resulted in nine factors, consisting of 52 items and explaining 60.7% of the variance. Overall, the PCA show that none of the Australian factors were replicated, but many items

loaded on the same factor and were similar as regards content. The Norwegian factors were therefore given names similar to the Australian factors. Scale scores were calculated by summation of items defining the Norwegian factor structure outlined in Table 1. The internal consistency of the scales ranged from 0.70 (Stress of adult responsibility) to 0.89 (Stress of home life) with all scales having internal consistency above 0.70. This indicates good internal consistency for all scales (Gregory, 1992). The final component correlation matrix is presented in Table 3. As can be seen, the scale scores show modest to strong inter-correlations.

Age and gender

Table 2 shows significant gender differences in self-reported adolescent stress in seven of nine scales. In all scales girls scored higher than boys, and this is a finding consistent with the Australian results (Byrne *et al.*, 2007). The correlation of each Norwegian scale and age was weak to moderate, with significant correlations found in four of the nine scales (see Table 3).

Concurrent criterion validity

Table 3 shows the correlation between the nine scale scores and the three criterion measures of anxiety, depression and self-esteem, which were employed to test for concurrent criterion validity of the ASQ-N. The results show that all nine scale scores show significant medium to strong correlations, and all scales correlated in the expected direction with all three measures; positively with anxiety and depression and negatively with self-esteem.

DISCUSSION

The aim of this study was to investigate the factor structure of the Norwegian version of the Adolescent Stress Questionnaire (ASQ-N) in a Norwegian adolescent sample. The aim was also to examine gender and age differences in nature and level of stress and see how the scale scores correlated with depression, anxiety and self-esteem. The results of the PCA showed that none of the factors replicated the original Australian factor structure and the Norwegian PCA showed difference both in number of factors and in the overall factor structure. The Norwegian PCA led to a new factor structure, consisting of 52 items and nine correlated factors/dimensions, explaining 60.7% of the variance. The factors reflected dimensions of adolescent stress which are qualitatively consistent with the contemporary literature on the stressfulness of adolescence (McNamara, 2000). The Norwegian factor structure like the Australian also demonstrated scales with high internal consistency. Cronbach's alpha for the Norwegian scales went from 0.70 to 0.89 and the Australian scales went from 0.62 to 0.92 (Byrne *et al.*, 2007), something which lends support to the strength of the instrument. The fact that some of the Norwegian items led to new factors and others were not included in any of the factors indicates that the factor structures in the two countries may have different underlying meanings and that the pattern of stress experienced by Norwegian adolescents may be somewhat different. However, most of the factors are similar as regarding content and the Norwegian factors were therefore named similar

Table 1. Factor structure of the ASQ-N and component (scale) item loadings

	Item loading	Australian factor solution (Byrne <i>et al.</i> 2007)
<i>Factor 1 – Stress of teacher/adult interaction (35.6% variance)</i>		
Item 55: Lack of respect from teachers	0.68	F6: Stress of teacher interaction
Item 57: Getting along with your teachers	0.66	F6: Stress of teacher interaction
Item 45: Not being listened to by teachers	0.60	F6: Stress of teacher interaction
Item 41: Teachers hassling you about the way you look	0.59	F6: Stress of teacher interaction
Item 49: Parents hassling you about the way you look	0.47	F1: Stress of home life
Item 44: Lack of trust from adults	0.42	F1: Stress of home life
Cronbach's alpha = 0.85		
<i>Factor 2 – Stress of peer pressure (4.8% variance)</i>		
Item 32: Pressure to fit in with peers	0.70	F5: Stress of peer pressure
Item 54: Peers hassling you about the way you look	0.68	F5: Stress of peer pressure
Item 56: Disagreements between you and your peers	0.56	F5: Stress of peer pressure
Item 8: Being hassled for not fitting in	0.55	F5: Stress of peer pressure
Item 28: Being judged by your friends	0.52	F5: Stress of peer pressure
Item 30: Changes in your physical appearance with growing up	0.48	F5: Stress of peer pressure
Item 36: Satisfaction with how you look	0.45	F5: Stress of peer pressure
Item 17: Being ignored or rejected by the person you want to go out with	0.42	F4: Stress of romantic relationships
Cronbach's alpha = 0.85		
<i>Factor 3 – Stress of home life (4.1% variance)</i>		
Item 37: Disagreements between you and your mother	0.81	F1: Stress of home life
Item 31: Arguments at home	0.80	F1: Stress of home life
Item 29: Disagreements between your parents	0.72	F1: Stress of home life
Item 35: Living at home	0.57	F1: Stress of home life
Item 1: Disagreements between you and your father	0.57	F1: Stress of home life
Item 48: Lack of understanding by your parents	0.51	F1: Stress of home life
Item 13: Abiding by petty rules at home	0.48	F1: Stress of home life
Item 21: Disagreements between you and your brothers and sisters	0.45	–
Item 2: Not being taken seriously by your parents	0.41	F1: Stress of home life
Item 46: Parents expecting too much from you	0.36	F1: Stress of home life
Cronbach's alpha = 0.89		
<i>Factor 4 – Stress of adult responsibility (3.8% variance)</i>		
Item 7: Concern about your future	0.65	F7: Stress of future uncertainty
Item 34: Having to make decisions about future work or education	0.49	F1: Stress of home life
Item 9: Keeping up with the school work	0.47	F2: Stress of school performance
Cronbach's alpha = 0.70		
<i>Factor 5 – Stress of romantic relationships (3.1% variance)</i>		
Item 52: Getting along with your boy/girl-friend	0.82	F4: Stress of romantic relationships
Item 27: Making the relationship with your boy/girl-friend work	0.82	F4: Stress of romantic relationships
Item 40: Not having enough time for your boy/girl-friend	0.74	F4: Stress of romantic relationships
Item 58: Breaking up with your boy/girl-friend	0.67	F4: Stress of romantic relationships
Cronbach's alpha = 0.79		
<i>Factor 6 – Stress of school attendance (2.7% variance)</i>		
Item 33: Compulsory school attendance	0.54	F3: Stress of school attendance
Item 39: Going to school	0.51	F3: Stress of school attendance
Item 4: Little or no control over your life	0.41	F1: Stress of home life
Item 42: Abiding by petty rules at school	0.30	F6: Stress of teacher interaction
Item 3: Getting up early in the morning to go to school	0.39	F3: Stress of school attendance
Cronbach's alpha = 0.72		
<i>Factor 7 – Stress of school/leisure conflict (2.5% variance)</i>		
Item 26: Not enough time for activities outside of school hours	0.88	F8: Stress of school/leisure conflict
Item 23: Not getting enough time for leisure	0.87	F8: Stress of school/leisure conflict
Item 19: Not having enough time for fun	0.73	F8: Stress of school/leisure conflict
Item 24: Having too much homework	0.65	F8: Stress of school/leisure conflict
Item 53: Lack of freedom	0.47	F8: Stress of school/leisure conflict
Item 25: Not getting enough timely feedback on schoolwork	0.31	F6: Stress of teacher interaction
Item 50: Work interfering with social activities	0.32	F10: Stress of emerging adult responsibility
Cronbach's alpha = 0.86		
<i>Factor 8 – Stress of school performance (2.1% variance)</i>		
Item 5: Having to study things you don't understand	0.72	F2: Stress of school performance
Item 6: Teachers expecting too much from you	0.58	F2: Stress of school performance
Item 16: Having to study things you are not interested in	0.55	F2: Stress of school performance
Item 14: Having to concentrate too long during school hours	0.53	F2: Stress of school performance
Item 12: Difficulty with some subjects	0.42	F2: Stress of school performance

Table 1. *Continued*

	Item loading	Australian factor solution (Byrne <i>et al.</i> 2007)
Cronbach's alpha = 0.81		
<i>Factor 9 – Stress of financial pressure (2.0% variance)</i>		
Item 38: Not enough money to buy the things you want	0.71	F9: Stress of financial pressure
Item 51: Not enough money to buy the things you need	0.64	F9: Stress of financial pressure
Item 22: Pressure to make money	0.49	F9: Stress of financial pressure
Item 47: Having to take on new financial responsibilities with growing older	0.39	F9: Stress of financial pressure
Cronbach's alpha = 0.79		
<i>Items not loading/not included:</i>		
Item 10: Employers expecting too much from you		
Item 11: Having to take on new familial responsibilities with growing older		
Item 43: Pressure of study		
Item 18: Disagreements between you and your teachers		
Item 20: Putting pressure on yourself to meet your future goals		
Item 15: Lack of school resources		

Table 2. *ASQ-N scales and gender*

Stress of -	Boys (<i>n</i> = 321)			Girls (<i>n</i> = 327)			<i>t</i>
	Mean	<i>SD</i>	Range	Mean	<i>SD</i>	Range	
F1: Teacher/adult interaction	13.26	5.78	7–35	13.73	6.14	7–35	–1.10 NS
F2: Peer pressure	14.58	6.19	8–40	16.29	7.06	8–40	–3.25 ***
F3: Home life	20.16	8.00	10–50	22.94	9.16	10–50	–4.03 ***
F4: Adult responsibility	7.11	2.96	3–15	8.52	2.96	3–15	–5.88 ***
F5: Romantic relationships	7.83	3.88	4–20	8.79	4.65	4–20	–2.81 **
F6: School attendance	12.24	4.57	5–25	12.64	4.57	5–25	–1.02 NS
F7: School/leisure conflict	17.22	6.70	7–35	18.66	6.91	7–35	–2.59 ***
F8: School performance	12.98	5.00	5–25	13.87	4.65	5–25	–2.16 *
F9: Financial pressure	9.05	4.05	4–20	10.23	4.10	4–20	–3.61 ***

Note: Cases excluded listwise.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 3. *Component (scale) correlation matrix and age, anxiety, depression and self-esteem*

	F1	F2	F3	F4	F5	F6	F7	F8	F9	Age	Anxiety	Depression	Self-Esteem
F1	–	0.59**	0.63**	0.40**	0.41**	0.57**	0.60**	0.52**	0.53**	0.07	0.41**	0.42**	–0.31**
F2		–	0.61**	0.53**	0.50**	0.50**	0.57**	0.53**	0.53**	–0.02	0.55**	0.50**	–0.45**
F3			–	0.56**	0.43**	0.62**	0.57**	0.54**	0.61**	0.03	0.48**	0.54**	–0.41**
F4				–	0.39**	0.53**	0.54**	0.58**	0.54**	0.14**	0.48**	0.53**	–0.39**
F5					–	0.42**	0.46**	0.36**	0.43**	0.12**	0.36**	0.39**	–0.25**
F6						–	0.65**	0.65**	0.60**	0.04	0.41**	0.47**	–0.31**
F7							–	0.62**	0.54**	–0.02	0.36**	0.39**	–0.30**
F8								–	0.54**	0.09*	0.40**	0.44**	–0.33**
F9									–	0.22**	0.38**	0.53**	–0.35**

Note: Cases excluded listwise.

* $p < 0.05$; ** $p < 0.01$.

as the Australian, reflecting stress of: “teacher/adult interaction”, “peer pressure”, “home life”, “adult responsibility”, “romantic relationships”, “school attendance”, “school/leisure conflict”, “school performance and “financial pressure.” The few items that loaded differently in the Norwegian compared to the Australian factor structure were items where the Norwegian and the Australian adolescents seem to have focused on different parts of the item. Even if correctly, semantically translated, it seems like the

two samples have put their weight on different parts of these items. Six items did not load on any of the factors in the Norwegian PCA. The items reflected stress of “employers expecting too much from you”, “having to take on new family responsibilities with growing older”, “putting pressure on yourself to meet your future goals”, “pressure of study”, “disagreements between you and your teachers” and “lack of school resources”. These items reflect the stress of taking more adult responsibilities with

growing older both familial and academic. The items reflecting stress of adult responsibility may not be a central issue for adolescents in the present sample because most adolescents in the present age group live with their parents and are provided for by them. The difference may reflect the possibility that Norwegian adolescents have fewer responsibilities than those in Australia. It may be that the transition from being dependent on parents, to having to take on responsibilities and to be seriously thinking about the future is less present in that age group of Norwegian young. It may, for example, reflect the fact that all young people in Norway have the right to both a free secondary education – that is, the private high-school education system, common in Australia, is non-existent in Norway – and that Norway has a free university or college education system.

Explaining the pattern of variation in underlying factor structures is not easy, but some of the differences can partly be explained by adolescents living in different geographical regions reporting different life events. Although some stressors are more universal across different cultures, adolescents living in Norway may report a higher incidence of some life events which are less relevant to Australian adolescents and vice versa (Plunkett *et al.*, 2000). Further, it is likely that adolescents in different communities may have different experiences of some life events (Parker, Gladstone & Chee, 2001; Romero, Carvajal, Valle & Orduna, 2007). A broader conceptual view of the nature of adolescent stressors reflects the prevailing social context at any point in time (Plunkett *et al.*, 2000), and supports the idea that Norwegian and Australian adolescents may experience different stressors and different levels of stressor exposure in their daily life. Cultural and gender differences can also have had some impact on how the items are interpreted by the adolescents. For example, the language which adolescents use, and more importantly the jargon they choose to report and describe the experience of stressors, may be somewhat different between the two adolescent cultures (Merchant, 2001). With regards to the school environment as a source to stressor experience for adolescents (Byrne *et al.*, 2007), the schools included in the Australian study were both private, Catholic and public, while the Norwegian schools were only public. This might also have been a possible source for differences between the two samples.

Examining ASQ-N and scales in relation to measures of anxiety, depression and self-esteem, revealed significant and medium to strong correlations in expected directions were still found. All scales correlated positively with depression and anxiety and negatively with self-esteem. This indicates that the stress instrument relates to measures of emotional distress and of self-perceptions in ways which indicate that the instrument is a valid measure of stressor experience. Stressful life events are among the factors that have been shown to be clearly related to the development of depressive symptoms in adolescence (Waaktaar *et al.*, 2004). The same association is found with stress and anxiety (Byrne *et al.*, 2007; Jose & Ratcliffe, 2004) and with stress and self-esteem (Byrne *et al.*, 2007; Jose & Ratcliffe, 2004). All these results contribute to confirming the use of the ASQ-N in Norwegian adolescents. However, given the cross-sectional design, one must be aware of the possibility of reciprocal associations between the ASQ-N scales and the measures used in the present study. Affect can influence both reporting of stressor experience and assessments of stressor impact (Byrne *et al.*, 2007).

Significant gender differences were evident in seven of the nine scales, reflecting stress of peer pressure, home life, adult responsibility, romantic relationships, school/leisure conflict, school performance and financial pressure, where girls reported higher levels of stress in each case compared to boys. This is consistent with Australian ASQ research showing that girls tend to score higher on all stress scales (Byrne *et al.*, 2007) and also the general literature on gender and stress in adolescents (Jose & Ratcliffe, 2004; Rudolph, 2002). The correlations with age suggest that stressor experience reported by adolescents also may be age-sensitive. The present study indicated low but significant associations between adolescents' age and the ASQ-N scales, reflecting increasing stress arising from adult responsibility, romantic relationships, financial pressure and school performance as later adolescence approached. In spite of the generally weak correlations between age and the scales, the results contribute to evidence that transition from earlier stages of adolescence to later ones brings a corresponding transition in the nature of the stressors encountered by adolescents (Fenzel, 2000; Isakson & Jarvis, 1999). Further, it is well known that as adolescents gain a sense of autonomy as they get older, they will be more challenged by the constraining characteristics of their environment through academic demands and emerging adult responsibility, and an assumption that they will meet higher expectations from their social environment as the peer group becomes more important (Grant, Behling, Gipson & Ford, 2005; Suldo *et al.*, 2008). Thus, what may be a minor concern for younger adolescents becomes a greater challenge for those approaching adulthood (Byrne *et al.*, 2007).

Although the sample size was reasonably high, with respondents from rural and urban areas, differences in sample characteristics may have had impact on the results. Recruitment of more respondents could have contributed in covering a broader socio-cultural profile of adolescents in the study. The PCA on the Norwegian data came out with changes in factor structure compared to the original Australian model, showing that stress dimensions are complex and not stable. Moreover, the instrument shows good internal consistency. The instrument relates to measures of emotional distress and of self-perceptions in ways which indicate that the instrument has potential as a valid measure of stressor experience. There are gender differences on the subscales, but these are consistent with the study of Byrne *et al.* (2007) and other existing literature. The weak correlations between the subscales and age indicate that the instrument has potential utility across a broad age span of adolescence, but some of the dimensions also seem to be more sensitive to age. This study has contributed to an understanding of how the ASQ may perform as a measure of stress in Norwegian adolescents.

Positive aspects of the instrument are that it covers the broad domains of adolescent stressor experience rather than focusing only on specific components. The instrument also allows adolescents to report to what extent these stressors have constituted a psychological impact on them as individuals through reports of subjective stressor load (Byrne *et al.*, 2007). The stability of the ASQ-N still needs to be tested across cohorts and over time to see how stable the instrument is for use on Norwegian adolescents. However, establishment of this will give greater weight to claims of validity for the ASQ-N as a useful measure of stress among adolescents in Norway.

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