



Profiles of adolescent stress: The development of the adolescent stress questionnaire (ASQ)

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Abstract

The importance of stress in the understanding of adolescent health and well-being is widely documented. The measurement of adolescent stress has however been subjected to sufficient methodological and conceptual criticism in recent times to warrant a concerted re-evaluation of the exercise. This study sought information on the nature of adolescent stressors, building on a previous instrument developed by the first author to ask adolescents themselves to inform the development of a pool of new items reflecting stressor experience and to advise on the wording of these items to comprehensively assess that experience. This pool of items was then administered as a self-reported questionnaire to a large sample of school-age adolescents ($N > 1000$) together with a scale to assess the intensity of distress arising from stressor occurrence. Principal components analysis of the questionnaire yielded 10 internally reliable dimensions of adolescent stress, the nature of which were consistent with the available literature on adolescent stressor experience. Scales constructed from this PCA related positively to measures of anxiety and depression, and negatively to a measure of self-esteem, suggesting that they were valid measures of adolescent stress. Test–retest reliability was good for all scales. The resultant Adolescent Stress Questionnaire (ASQ) is therefore suggested to have potential for the measurement of adolescent stress in both research and clinical contexts.

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Introduction

Of all life-stages adolescence is arguably the one most marked by rapid and potentially tumultuous transition (Brockman, 2003; Cook & Furstenberg, 2002). This is to be seen not just in the domain of biological development where changes are externally manifest (Siefert & Hoffnung, 2000) but is equally evident in the progression of both cognitive (Eccles, Wigfield, & Byrnes, 2003) and psychosocial (Muzi, 2000) maturity from that of childhood to that of the fully functioning adult. While the transition through adolescence is inevitable (Price, 1985) the speed and magnitude of these changes overtax the capacity of many young people to cope (Collins, 2001; Davis, 2003; Jessor, 1993) and the resulting phenomenon of adolescent stress is now well recognized (Byrne & Mazanov, 2002).

The experience of stress at whatever age is acutely uncomfortable (Ursin & Olf, 1993); what is more important however is the capacity of stress to adversely affect individual states of health either through direct impact or through the mediation of health risk behaviours (Rice, 1999). The time course over which stress might be expected to influence the development of significant physical pathology is probably too great for any reliable association between stress and somatic illness to become evident in adolescence (Mandler, 1984). There is persuasive evidence however that the experience of adolescent stress relates consistently to the occurrence of psychiatric symptomatology of clinical significance (Grant, Compas, Thurm, McMahon, & Gipson, 2004; West & Sweeting, 2003), including depression (Deardorff, Gonzales, & Sandler, 2003; Diaz, Symantov & Rickert, 2002; van der Wal, de Wit, & Hirasig, 2003), suicidal ideation (Diaz et al., 2002) and actual risk of suicide (Johnson et al., 2002). In this regard, and in line with the broader base of evidence on adolescent stress (Byrne & Mazanov, 2002) girls seem to be more vulnerable in the face of adversity than boys (Brooks, Harris, Thrall, & Woods, 2002; Stevens, Murphy, & McKnight, 2003).

But adolescence is also a time when risks are laid down for chronic conditions which will only become manifest in later adulthood. The experience of adolescent stress has been systematically associated with a range of health compromising lifestyles and behaviours (Larouche, 1998; Murphy et al., 2001; Neumark-Sztainer, Story, French, & Resnick, 1997) including the failure to control obesity (Mellin, Neumark-Sztainer, Story, Ireland, & Resnick, 2002), physical inactivity (Allison, Adlaf, Ialomiteanu, & Rehm, 1999), early and possibly heavy alcohol use (Allison et al., 1999; Udry, Li, & Hendrickson-Smith, 2003) and the onset of cigarette smoking (Byrne & Mazanov, 2003; Tyas & Pederson, 1998). There can be no doubt therefore that the experience of adolescent stress constitutes an issue of central importance to the broader understanding of adolescent health. In this context the availability of a valid and reliable instrument with which to measure adolescent stress is essential.

The methodology surrounding the measurement of stress has long been controversial and this applies just as strongly to studies of adolescents (Mullis, Young, Mullis, & Ralstage, 1993; Grant et al., 2004) as it does to the more widely researched area of adult stress (Henderson, Byrne, & Duncan-Jones, 1981). The issue of interview versus inventory (or self-report questionnaire) approaches has been debated for both age groups but while there is some attraction in the experiential and contextual detail which interview methods may elicit they are both time consuming and labour intensive, and not therefore practical for large sample studies of adolescent health; moreover, they lack anonymity and may not therefore yield truly unbiased information in

threatened individuals (Grant et al., 2004). Self-report based approaches broadly speaking seem thus to offer the method of choice in measuring adolescent stress.

This raises the parallel issue of stimulus versus process or outcome approaches to the measurement of stress. Comprehensive models of stress (see, for example, Rice, 1999) emphasize the multi-phasic nature of the construct, with exposure to environmental events then undergoing cognitive interpretation which may (or may not) ultimately evoke a potentially harmful stress response. Measures of stress have typically focused variously on documenting exposure to environmental events, estimating the extent to which those events are cognitively interpreted as noxious, or assessing the magnitude of the resulting stress response (Rahe, Veach, Tolles, & Murakami, 2000).

A good deal of work on the assessment of adolescent stress (for example, Bagley, 1993; Mitic, McGuire, & Neuman, 1985; Bonaguro, Rhonehouse, & Bonaguro, 1988; Wills, 1986) has adopted the relatively simple expedient of focusing on measures of the stress response, either through subjective clinical assessments or self-reports of distress, and often in already psychologically dysfunctional samples. But while this can be based on the convenient use of already well-established clinical or psychometric instruments it runs the significant risk of confusing consequences with causes, and therefore of producing associations which may be spurious. This concern is now well documented in the extensive literature on adult stress measurement (Quick, Quick, & Gavin, 2000; Rahe et al., 2000; and see Cohen, Kessler, & Underwood-Gordon, 1995, for an extensive edited review). Similar concerns have been voiced in regard to a measurement focus on cognitive interpretations of stressor exposure (Byrne & Whyte, 1980; Tamres, Janicki, & Helgeson, 2002) where consequences may also contaminate measured ratings of stressor experience. The substantial methodological cautions surrounding either cognitive interpretations of stressor exposure or the assessment of the stress response itself, as foci for the measurement of stress, indicate clearly therefore that a measure based on the documentation of stressor exposure (the stimulus or environmental event approach) offers far fewer methodological (and conceptual) pitfalls than do measures either of interpretation or response.

Acceptance of this view has given rise to a number of inventories of adolescent stressors over the past two decades or so, responses to which have been used to establish associations between adolescent stress and a range of health and adaptation problems. While this may be seen as an advance, approaches to the development of stressor lists are not without criticism. Some have derived from the adaptation of existing inventories of adult stressors, the item contents of which have been modified to a greater or lesser extent to inquire into the experience of adolescents (Coddington, 1972; Labouvie, 1986). This approach is flawed since it indirectly equates stressors common in adult life with those evident in adolescence, producing inventories of stressors only questionably representative of adolescent experience and leaving potentially crucial areas of stressor exposure in adolescence largely unmeasured (Grant et al., 2004). Other studies have used scales the item content of which is dominated by stressors of specific and particular interest to the researcher (for example the experience of childhood abuse, Bagley, 1993). This latter approach loads stressor measurement in favour of populations with already dysfunctional characteristics, so risking underestimates of stressor exposure in populations not so characterized. These concerns call into serious question the issue of whether the universe of stressors broadly reflective of adolescent experience has been adequately tapped in studies so far reporting links between adolescent stress and a range of adolescent problems.

These measurement concerns were explicitly identified by [Compas, Davis, Forsythe, and Wagner \(1987\)](#) in their development of the *Adolescent Perceived Events Scale*, and that instrument fulfilled an important purpose for its time. However, while this scale was based on the meticulous listing of stressor items generated by adolescents themselves (so addressing the second concern raised above) the resultant list was lengthy (148 events) and age-dependent, so limiting its use in large sample studies of adolescent stress and health covering the broad adolescent age range. Moreover, as will be introduced below, experience in measuring adolescent stressors indicates that the nature of adolescent stressors and the language used by adolescents to report the occurrence and individual impact of these may change over time so that the currency of inventories of adolescent stressors may be limited to a decade or so ([Byrne & Mazanov, 2002](#)). The development of a new instrument therefore seemed fully warranted.

The Adolescent Stress Questionnaire (ASQ) ([Byrne, Byrne, & Reinhart, 1995](#); [Byrne & Mazanov, 2002](#)) was expressly constructed to address these methodological issues, and in particular to ensure that the list of stressors presented to adolescents to allow an assessment of their own individual experience was broadly salient to the contemporary issues facing young people at that time. The original instrument of 31 items reflecting seven clearly identifiable dimensions of adolescent stress was effectively used in a number of substantial investigations of adolescent smoking onset, the use of alcohol and other drugs, and health risk behaviours generally ([Byrne & Mazanov, 1999, 2001, 2003](#); [Byrne & Reinhart, 1998](#); [Mazanov & Byrne, 2002](#)). It has also been used in other studies in Australia and internationally. However, while this work has affirmed the utility of the ASQ in successfully identifying adolescents at risk of health compromising behaviours, recent use of the instrument indicates a clear need for revision. First, some adolescents completing the ASQ have commented informally on the contemporary relevance of some existing items to their current experience and have noted the absence of other areas of inquiry they would see as more relevant now (issues of future education, employment and economic survival stand out here). Others still have questioned the adequacy of items in the ASQ in spanning the complete age range of adolescence (13–19 years), and the language used to present those items. Moreover, a confirmatory factor analytic examination of serial data from the ASQ ([Byrne & Mazanov, 2002](#)) against the original factor structure ([Byrne et al., 1995](#)) has not shown the instrument to be as stable over time as would be required for it to have complete on-going utility. All this clearly indicates the need for systematic research to comprehensively examine the nature and measurement of adolescent stress in the early 21st century. The current paper addresses that issue.

Method

The study was carried out in two phases; the first involved generation of adolescent stressor items using focus groups while the second involved the development and psychometric evaluation of the revised ASQ based on these items.

Focus groups

These were first conducted using standard focus group methodology ([Stewart & Shandasani, 1990](#)). Four groups each consisting of eight participants (age-diverse and gender balanced) were

run in single sessions lasting around 60 min each. All groups were conducted by a trained clinical psychologist skilled in establishing rapport and comfort, and to facilitating open discussion within groups of adolescents. A few brief examples of adolescent stressors randomly taken from the original ASQ were used to introduce the notion of adolescent stress but the instrument was not circulated to group participants. They were then asked to “brain-storm” the kinds of concerns and challenges associated with the experience of adolescence which they believed had affected them or those around them. Detailed records of each group were kept and a careful examination of these both by the group leader and the senior author (again a trained clinical psychologist) was then used to (a) confirm the continued salience of items contained in the original ASQ for contemporary adolescent experience, (b) recommend the addition of new items reflecting dimensions of adolescent stress not covered by the original ASQ, and (c) review forms of wording for original or new items, in line with input from focus groups, to ensure that these were consistent with contemporary language use by adolescents. No item not generated or confirmed by the focus groups was included in the final questionnaire; nor was a pre-determined “taxonomy” of potential stressors offered to participants by way of a prompt to discussion.¹ To do so would have violated one of the clear and major criticisms of previous instruments, that item content should reflect the specific concerns voiced by adolescents themselves and not the preconceptions of those developing measures of adolescent stress (Compas et al., 1987).

Focus group results and the item content of the revised ASQ

The original ASQ (Byrne & Mazanov, 2002) contained 31 items distributed among 7 sub-scales which had been derived from a Principal Components Analysis (PCA) of 40 initial items chosen (again by focus group methodology) to reflect aspects of adolescent stress (Byrne et al., 1995). Of these 31 items, 20 were confirmed by the current focus group methodology to have continued salience for adolescents and were worded in ways which remained appropriate to the current adolescent vernacular (Erman, 2001; Merchant, 2001); a further 2 items were retained but re-worded in ways recommended by focus group participants to better reflect current adolescent language usage. These were supplemented by an additional 36 items generated by the focus group methodology. Focus groups explicitly questioned overlap between original and new items, and eliminated items which group members believed to overlap one another. Scrutiny for possible overlap was undertaken a second time when the focus group leader and senior author discussed final item inclusion in the revised ASQ. Some 58 items survived this process and were included for subsequent examination.

The psychometric study

Sample: Participants were school aged adolescents drawn from high schools (school years 7–10) and secondary colleges (school years 11 and 12) in Canberra.² Both the public and Catholic school

¹Indeed, it was considered to be of theoretical importance that any homogeneous taxonomy of stressor experience should emerge not through imposition but, if such a taxonomy actually existed, through appropriate factor analyses of initially heterogeneous data.

²Canberra is the Australian federal capital with a population of around 300,000 and a diverse socio-economic spread. Demographic details of the population may be found in the Social Atlas of Canberra (Australian Bureau of Statistics, 2001).

systems were used. Schools were initially selected to reflect a broad socio-demographic profile though around half of schools approached as part of the sampling frame declined to participate; examination of demographic areas of participant and non-participant schools revealed no conspicuous bias in representation. Focus groups (see later) consisted of around eight students per group selected on a volunteer basis; each group composition was gender balanced and spanned the school's age range. Participation in the main study was based on selection of whole year groups by participating schools though since participation was again voluntary and required parental consent for those under 18 years (see Procedure) the final sample was not complete for any school year. The main study ultimately employed a sample of $N = 1039$ (38.5% male and 61.5% female) with a mean age of 14.82 years (s.d. = 1.32) for males and 14.79 years (s.d. = 1.67) for females, and with a range of 13–18 years. Males and females were not significantly different in age.

Measures

All participants completed a composite questionnaire assessing:

- (a) Basic demographic information (age, sex and school year);
- (b) Adolescent stressor experience—using the ASQ, a 58-item inventory of common adolescent stressors the development of which is described below, which included 20 unaltered and 2 reworded items from the original ASQ (Byrne et al., 1995; Byrne & Mazanov, 2002) and an additional 36 items constructed from a detailed qualitative examination of information gathered from focus groups discussing adolescent stress and conducted with four groups of eight adolescents each (see Procedure). Each item (stressor) was rated on a 5-point Likert scale where 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 ASQ inquired about stressor exposure in the past year.
- (c) State Anxiety—this was chosen as a validating construct since state anxiety is one of the most ubiquitous and immediate consequences of stressor exposure in children (Goodyer, Wright, & Altham, 1990), adolescents (Lu, 1994) and adults (Eales, 1988). It was measured using the Spielberger State-Trait Anxiety Inventory (STAI: Spielberger, 1983) a 20-item questionnaire measuring respondents' level of state (current) anxiety and scored on a 4-point Likert scale ranging from not at all (1) to very much so (4). The STAI has been used extensively in adolescent populations (Barnes, Harp, & Jung, 2002; Hankin, Roberts, & Gotlib, 1997; Hishinuma et al., 2000). Internal consistency is high ranging from 0.83 to 0.92 (Spielberger, 1983). As expected of a measure of transient symptoms, the STAI state scale test–retest reliability is low, from 0.16 to 0.33 (Spielberger, 1983). In a meta-analysis of studies using the STAI, the mean internal consistency was 0.91 (Barnes et al., 2002). The STAI state scale demonstrates appropriate construct validity, correlating with other variables in ways consistent with theoretical predictions. For example, state scores are correlated with adolescent's measures of the discrepancies between actual and desired self ratings (Hankin et al., 1997).
- (d) State depression—this was chosen as another validating construct since state depression too is a common and immediate consequence of stressor exposure (Rijsdijk et al., 2001; Patton, Coffey, Posterino, Carlin, & Bowes, 2003). While specific instruments are available to assess adolescent depression (the Reynolds Adolescent Depression Scale (Reynolds & Mazza, 1998)

is probably the archetype), these are typically far lengthier than is convenient for a screening assessment of depression in a large sample, and oriented too far towards the diagnosis of clinical depression to be useful as a simple index of (state) non-clinical depressive mood. Clinically focussed instruments also have the potential to alienate otherwise healthy participants in an essentially normal sample. It was therefore decided to construct a non-clinical depression scale specifically for the purposes of the present study. It consisted of a short, 15-item questionnaire measuring respondents' level of current depressive mood. Item choice was informed by reference to commonly experienced depressive features outlined in the Diagnostic and Statistical Manual—Fourth Edition TR (DSM: American Psychiatric Association, 2000). Reference was also made to the Zung Self Rating Depression Scale (Zung, 1965) and the NYU School of Medicine website self-assessment scale for depression (<http://www.med.nyu.edu/Psych/screens/depres.html>). The items describe a number of commonly experienced but essentially non-clinical depressive attributes, and respondents were asked to indicate the extent to which they had experienced these symptoms in the past week using a 5-point Likert scale ranging from never (0) to always (4).³

- (e) Self-esteem—this was selected for measurement in view of its already clear and established associations with adolescent exposure to stressors (Byrne & Mazanov, 2001). It was measured using the Rosenberg Self-Esteem Scale (RSE: Rosenberg, 1965), a 10-item questionnaire measuring global self-esteem. Respondents were asked to indicate the extent to which the items best described the way they feel about themselves on a 4-point Likert scale ranging from 0 (strongly disagree) to 3 (strongly agree). The scale yields a single overall score of self-esteem with high scores indicating high levels of self-esteem. A recent review of the RSE concluded that it is a reliable and valid measure of global self-esteem through all ages, including adolescence (Chiu, 1988; Gray-Little, Williams, & Hancock, 1997). It has demonstrated high internal consistency (0.84: Hagborg, 1996; 0.88 Gray-Little et al., 1997) and high test–retest reliability over a 1-week (0.82: Fleming & Courtney, 1984) and 2-week period (0.82: Silbert & Tippet cited in Rosenberg, 1965). Good construct validity has been demonstrated in correlations with a number of other measures of similar constructs such as the Self-Rating Scale (Fleming & Courtney, 1984), the Single-Item Self-Esteem scale (Robins, Hendin, & Trzesniewski, 2001), and the Coopersmith's (1981) Self-Esteem Inventory (Crandall, 1973).

Procedure

Permission for all phases of the study was sought and received first from the Ethics in Human Experimentation Committee of the Australian National University and then from both the Department of Education of the Australian Capital Territory (ACT) government and the ACT and Regional Catholic Education Office. High schools and secondary colleges in both sectors are largely autonomous for administrative purposes and so invitations to participate were sent to those selected to reflect a broad socio-demographic spread of the ACT population. Ethics Committee approval required active parental consent following receipt of written information

³The depression scale had an internal reliability (Cronbach's alpha) of 0.91 and correlated positively and significantly ($r = +0.67$) with the measure of state anxiety, and negatively and significantly ($r = -0.63$) with the measure of self-esteem.

regarding the nature and intent of the study for all those under 18 years of age; personal informed consent was also required for those 18 years and older. Consent forms were therefore distributed along with information sheets prior to data collection, and completed consent forms were required before any approach was made to the potential participants themselves.

Questionnaire administration consisted of a single administration of the comprehensive questionnaire outlined in the *Measures* section, with the ASQ boosted by the addition of 36 new items derived from focus group discussions. Questionnaire administration was conducted in whole class groups during class time and fully supervised; so far as possible, this was undertaken at the same time for all classes participating within a single school (to avoid the possibility of collusive responses). Since no whole sample follow-up was required questionnaires were not identified in any way and anonymity was guaranteed.

Following the completion of the main psychometric study two schools agreed to participate in a brief follow-up exercise to examine test–retest reliability of the new ASQ. Data collection was again preceded by the collection of informed parental consent. A sample of 105 participants (around 10% of the main study sample) was selected on a volunteer basis and two administrations of the ASQ alone, 1 week apart, were undertaken. To preserve anonymity two identical questionnaires were placed into separate envelopes which were firmly attached to each other. The package was handed out in class time and questionnaire #1 was completed, returned to its envelope and sealed. Participants kept the packages in their school desks. One week later, again under supervised conditions, questionnaire #2 was completed, returned to its envelope and sealed. Completed packages were then collected.

Results

PCA of the revised ASQ

The final 58 items were subjected to the PCA to explore whether any latent components existed in the data. Importantly, confirmatory work on the original ASQ (Byrne & Mazanov, 2002; Mazanov, 2003) using three independent data sets indicated that the components underlying adolescent stress were correlated. This varied from the original PCA which assumed the components would be unrelated or orthogonal (Byrne et al., 1995). Given that the oblique (correlated) structure has been confirmed in three independent data sets, the current PCA was conducted using an Oblimin rotation ($\delta = 0$) which allows components to be related. This being so, it is impossible to separate out the unique contribution to variance of any one component relative to the others. Thus, while the percentage of variance associated with each component is reported, it is not possible to provide an estimate of the total variance accounted for by the entire scale.

Multivariate analyses such as PCA are sensitive to violations in a number of assumptions that have to be met to ensure an accurate analysis of the data and to minimize statistical error (Tabachnik & Fidell, 1996). Therefore, the data were screened in preparation for the exploratory PCA according to the protocol and techniques set out in Tabachnik and Fidell (1996). The first step involved removal of cases with any missing data ($n = 100$) and cases with univariate or multivariate outliers, leaving $n = 856$ cases available for the PCA. The second step assessed normality with the highest skewness for any variable 1.737 and the highest kurtosis 1.864. These

values are less than the threshold of 3 set by Kline (1994) to indicate the point at which non-normality may become a concern in the context of a PCA. If the relationship between the items follows anything other than a straight line the analysis may become flawed. Inspection of scatter plots from 10 randomly selected items indicated no nonlinearity was apparent. The determinant of the covariance matrix was small (1.172×10^{-15}), suggesting multi-collinearity or singularity may be present in the data (which in this case would suggest that variance in one item was explained by the variance observed in a combination of other items). Testing on the protocols suggested by Hair, Anderson, Tatham and Black (1995), was therefore undertaken but this indicated that neither multi-collinearity nor singularity were present. The correlation matrix indicated the ASQ was therefore factorable with a proportion of correlations greater than 0.3 present (ie there was enough inter-correlation between the items that suggested latent components to justify conducting a PCA). While important statistical considerations necessitated removal of a non-trivial number of participants (about 17%) from the eventual PCA there were no gender differences between those excluded and those who remained in the analyses though the PCA group was marginally older (mean = 14.9 years) than the excluded group (mean = 14.4 years); the difference was (again marginally) statistically significant ($t = 4.11, p < 0.01$).

The PCA performed on the screened data yielded 11 components (see Table 1). The variance associated with each component is also presented in Table 1. Internal reliabilities (Cronbach's Alpha) were also calculated for all components and these too may be seen in Table 1.

As noted above, due to the correlation of the components it is inappropriate to sum the explained variance to estimate the amount of variance in the questionnaire explained by the model. Note that component 10 in the original PCA was reflected by only one item. It was therefore omitted from further analysis since the inclusion of a single item scale would have insufficient reliability to make it a useful predictor of future adolescent behaviour, whether adaptive or otherwise. The final component correlation matrix is presented in Table 2.

For the purposes of deriving self-reported adolescent stress, scores reflecting the extent to which individual respondents were characterized by each of the remaining 10 components (dimensions) of adolescent stressor experience were calculated simply by summing the affirmed response to each item (1 to 5—see Measures section above) across all items defining the component. Distributions of dimension scores broken down by gender may be seen in Table 4.

As may be seen in Table 2, some component (scale) scores were modestly inter-correlated; this is to be expected given the nature of the method of factor rotation (oblique and not orthogonal). For the reason that each scale shared some variance with each other scale it was correlated with (though the extent of this sharing was not able to be precisely calculated), analyses using a total score had the potential to increase the chances of Type I error (Tabachnik, & Fidell, 1996); the total score was not therefore computed and all subsequent analyses have been made using the scale scores only.

Age and gender

Age was positively and significantly (if modestly) correlated with both anxiety and depression scores, and both positively and significantly (though equally modestly) with several dimensions of adolescent stress; it was somewhat more robustly correlated with the dimension of stress reflecting concern about the future. These correlations are presented in Table 3.

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

	Item loading
Scale 1— <i>Stress of Home Life</i> (9.7% variance)	
Arguments at home ^a	0.64
Disagreements between your parents ^a	0.64
Disagreements between you and your mother ^a	0.62
Disagreements between you and your father ^a	0.61
Lack of understanding by your parents ^a	0.58
Abiding by petty rules at home	0.57
Living at home ^a	0.54
Not being taken seriously by your parents	0.51
Little or no control over your life	0.45
Lack of trust from adults	0.43
Parents expecting too much from you ^a	0.42
Parents hassling you about the way you look ^a	0.39
Alpha = 0.92	
Scale 2— <i>Stress of School Performance</i> (7.1% variance)	
Having to study things you do not understand ^a	0.69
Teachers expecting too much from you	0.65
Difficulty with some subjects ^a	0.58
Keeping up with schoolwork ^a	0.53
Having to study things you are not interested in ^a	0.44
Having to concentrate too long during school hours ^a	0.43
Pressure of study ^a	0.39
Alpha = 0.88	
Scale 3— <i>Stress of School Attendance</i> (4.3% variance)	
Getting up early in the morning to go to school ^a	0.64
Compulsory school attendance ^a	0.59
Going to school ^a	0.52
Alpha = 0.69	
Scale 4— <i>Stress of Romantic Relationships</i> (9.0% variance)	
Getting along with your boy/girl-friend	0.86
Breaking up with your boy/girl-friend	0.85
Making the relationship with your boy/girl-friend work	0.84
Not having enough time for your boy/girl-friend	0.82
Being ignored or rejected by the person you want to go out with ^a	0.43
Alpha = 0.86	
Scale 5— <i>Stress of Peer Pressure</i> (8.5% variance)	
Pressure to fit in with peers	0.78
Being hassled for not fitting in	0.78
Peers hassling you about the way you look	0.73
Being judged by your friends	0.72
Disagreements between you and your peers	0.40
Satisfaction with how you look	0.39
Changes in your physical appearance with growing up	0.31
Alpha = 0.88	

Table 1 (continued)

	Item loading
Scale 6— <i>Stress of Teacher Interaction</i> (10.0% variance)	
Lack of respect from teachers	0.81
Not being listened to by teachers	0.76
Getting along with your teachers	0.73
Disagreements between you and your teachers	0.60
Teachers hassling you about the way you look	0.56
Abiding by petty rules at school	0.49
Not getting enough timely feedback on schoolwork	0.28
Alpha = 0.87	
Scale 7— <i>Stress of Future Uncertainty</i> (6.7% variance)	
Concern about your future ^a	0.78
Having to make decisions about future work or education ^a	0.77
Putting pressure on yourself to meet your future goals	0.53
Alpha = 0.82	
Scale 8— <i>Stress of School/Leisure Conflict</i> (9.1% variance)	
Not getting enough time for leisure	0.86
Not enough time for activities outside of school hours ^a	0.78
Not having enough time for fun	0.77
Having too much homework ^a	0.45
Lack of freedom ^a	0.42
Alpha = 0.86	
Scale 9— <i>Stress of Financial Pressure</i> (8.7% variance)	
Not enough money to buy the things you need	0.84
Not enough money to buy the things you want	0.83
Pressure to make more money	0.53
Having to take on new financial responsibilities with growing older	0.44
Alpha = 0.83	
Scale 10— <i>Stress of Emerging Adult Responsibility</i> (1.7% variance)	
Having to take on new family responsibilities with growing older	0.44
Employers expecting too much of you	0.41
Work interfering with school and social activities	0.33
Alpha = 0.62	

Significant gender differences in self-reported adolescent stress were evident for seven of the ten stress dimensions; in all instances girls scored more highly than did boys, and the data are shown in Table 4.

Concurrent criterion validity

Three criterion measures (anxiety, depression and self-esteem) were employed to test for concurrent criterion validity of the ASQ. These three measures correlated strongly and in the expected directions with one another. All ten dimensions of adolescent stress correlated significantly and in the expected directions with these criterion measures (positively with measures

Table 2
Component (scale) correlation matrix

ASQ scales— <i>Stress of</i>	<i>Home Life</i>	<i>School Performance</i>	<i>School Attendance</i>	<i>Romantic Relationships</i>	<i>Peer Pressure</i>	<i>Teacher Interaction</i>	<i>Future Uncertainty</i>	<i>School/ Leisure Conflict</i>	<i>Financial Pressure</i>	<i>Adult Responsibility</i>
<i>Home Life</i>	—									
<i>School Performance</i>	0.22	—								
<i>School Attendance</i>	0.13	0.18	—							
<i>Romantic Relationships</i>	0.30	0.18	0.17	—						
<i>Peer Pressure</i>	−0.33	−0.22	−0.15	−0.34	—					
<i>Teacher Interaction</i>	−0.35	−0.22	−0.22	−0.38	0.37	—				
<i>Future Uncertainty</i>	0.26	0.29	0.07	0.26	−0.20	−0.18	—			
<i>School/Leisure Conflict</i>	−0.26	−0.37	−0.27	−0.29	0.26	0.32	−0.28	—		
<i>Financial Pressure</i>	−0.35	−0.18	−0.23	−0.35	0.26	0.38	−0.25	0.35	—	
<i>Adult Responsibility</i>	−0.06	0.05	0.10	0.11	−0.07	−0.13	0.07	−0.09	−0.08	—

Table 3
ASQ scales and age

ASQ scale	Correlation with age
<i>Stress of Home Life</i>	$r = 0.12^*$
<i>Stress of School Performance</i>	$r = 0.12^*$
<i>Stress of School Attendance</i>	$r = 0.06$, NS
<i>Stress of Romantic Relationships</i>	$r = 0.07$, NS
<i>Stress of Peer Pressure</i>	$r = -0.05$, NS
<i>Stress of Teacher Interaction</i>	$r = 0.06$, NS
<i>Stress of Future Uncertainty</i>	$r = 0.35^*$
<i>Stress of School/Leisure Conflict</i>	$r = 0.01$, NS
<i>Stress of Financial Pressure</i>	$r = 0.18^*$
<i>Stress of Emerging Adult Responsibility</i>	$r = 0.15^*$

* $p < 0.001$.

Table 4
ASQ scales and gender

ASQ scale	Boys ($N = 400$)	Mean (s.d.)	Girls ($N = 637$)	Mean (s.d.)	t
<i>Stress of Home Life</i>	26.78 (9.29)	Range = 11–55	31.01 (10.80)	Range = 11–55	6.70**
<i>Stress of School Performance</i>	17.63 (5.30)	Range = 6–30	19.11 (5.61)	Range = 6–30	4.23**
<i>Stress of School Attendance</i>	10.07 (3.65)	Range = 4–20	10.22 (3.68)	Range = 4–20	0.67, NS
<i>Stress of Romantic Relationships</i>	11.10 (5.24)	Range = 5–25	11.81 (5.92)	Range = 5–25	2.04*
<i>Stress of Peer Pressure</i>	15.07 (6.31)	Range = 7–35	17.11 (6.86)	Range = 7–35	4.91**
<i>Stress of Teacher Interaction</i>	15.25 (6.31)	Range = 7–35	15.28 (6.44)	Range = 7–35	0.06, NS
<i>Stress of Future Uncertainty</i>	11.14 (3.71)	Range = 4–20	12.60 (4.28)	Range = 4–20	5.82**
<i>Stress of School/Leisure Conflict</i>	14.72 (5.23)	Range = 5–25	15.48 (5.18)	Range = 5–25	2.28*
<i>Stress of Financial Pressure</i>	9.84 (3.69)	Range = 4–20	10.18 (4.40)	Range = 4–20	1.31, NS
<i>Stress of Emerging Adult Responsibility</i>	6.11 (2.65)	Range = 3–15	6.50 (2.91)	Range = 3–15	2.20*

* $p < 0.05$;

** $p < 0.001$.

of concurrent affect and negatively with self-esteem); strengths of associations ranged from modest to strong. The matrix of correlations can be seen in Table 5.

Test–retest reliability

The ASQ alone was administered to a sub-sample of participants ($N = 105$) 1 week after the initial administration and component scores were calculated for both administrations. Scores at time 1 correlated strongly with those at time 2 for all dimensions of adolescent stress and these correlations are presented in Table 6.

Table 5
ASQ scales and measures of state anxiety, depression and self-esteem

ASQ scale	State anxiety	Depression	Self-esteem
<i>Stress of Home Life</i>	$r = 0.43^*$	$r = 0.56^*$	$r = -0.38^*$
<i>Stress of School Performance</i>	$r = 0.34^*$	$r = 0.48^*$	$r = -0.34^*$
<i>Stress of School Attendance</i>	$r = 0.28^*$	$r = 0.40^*$	$r = -0.27^*$
<i>Stress of Romantic Relationships</i>	$r = 0.26^*$	$r = 0.35^*$	$r = -0.19^*$
<i>Stress of Peer Pressure</i>	$r = 0.40^*$	$r = 0.46^*$	$r = -0.40^*$
<i>Stress of Teacher Interaction</i>	$r = 0.28^*$	$r = 0.39^*$	$r = -0.28^*$
<i>Stress of Future Uncertainty</i>	$r = 0.43^*$	$r = 0.53^*$	$r = -0.34^*$
<i>Stress of School/Leisure Conflict</i>	$r = 0.27^*$	$r = 0.40^*$	$r = -0.26^*$
<i>Stress of Financial Pressure</i>	$r = 0.33^*$	$r = 0.42^*$	$r = -0.28^*$
<i>Stress of Emerging Adult Responsibility</i>	$r = 0.26^*$	$r = 0.37^*$	$r = -0.25^*$

* $p < 0.001$.

Table 6
Test–retest reliabilities of ASQ scales over one week

ASQ scale	Test–retest correlations
<i>Stress of Home Life</i>	$r = 0.88^*$
<i>Stress of School Performance</i>	$r = 0.81^*$
<i>Stress of School Attendance</i>	$r = 0.86^*$
<i>Stress of Romantic Relationships</i>	$r = 0.84^*$
<i>Stress of Peer Pressure</i>	$r = 0.86^*$
<i>Stress of Teacher Interaction</i>	$r = 0.80^*$
<i>Stress of Future Uncertainty</i>	$r = 0.79^*$
<i>Stress of School/Leisure Conflict</i>	$r = 0.81^*$
<i>Stress of Financial Pressure</i>	$r = 0.68^*$
<i>Stress of Emerging Adult Responsibility</i>	$r = 0.77^*$

* $p < 0.001$.

Discussion

Twenty-two items from the original ASQ (Byrne & Mazanov, 2002) were represented in the factors emerging from the current analysis, suggesting some continued utility for the item content of the original instrument. These items were combined statistically with 36 new items introduced following the focus group activity to define a new set of 10 factors,⁴ each of which was thematically meaningful within the existing body of theory and knowledge regarding the experience of adolescent stress (Alsaker & Flammer, 1999; McNamara, 2000). These factors were modestly inter-correlated as Table 2 shows.

⁴11 if the single item factor on sibling disagreements is included.

This was fully expected; as discussed above, the oblique method of factor rotation did not enforce independence and so cumulative estimates of variance can not be provided. Nonetheless, it is reasonable to consider these factors as the topical foundation for an instrument to comprehensively assess the existence of stress in the adolescent domain.

Factor descriptions

The first factor (estimated to account for around 9.7% of variance) was broadly characterized by statements of conflict within the home or domestic situation and was labeled *Stress of Home Life*. Eight items from two of the original ASQ scales (stress of family conflict and stress of parental control) loaded significantly onto this new factor together with a further four new items indicating lack of control and trust within the home situation. Difficulties experienced in the home situation are clearly important to the domain of adolescent stress (Call & Mortimer, 2001; Repetti, McGrath, & Ishikawa, 1999) and so it is not surprising that this area emerged as a prominent component of the scale.

The school or educational environment is also of crucial importance in the lives of adolescents (Deardorff, Gonzales, & Sandler, 2003; Repetti et al., 1999); in the present study population it is an environment within which they have little choice regarding interaction, and the implications of a satisfactory negotiation of that environment for future success are self-evident (Oyserman, Terry, & Bybee, 2002). Stressors within this environment are clearly reflected in the second new factor, estimated to account for around 7.1% of the variance. It was labeled *Stress of School Performance* and was made up of items from three of the original ASQ scales (stress of school attendance, stress of school performance and stress of educational irrelevance) together with a single new item indicating difficulty in keeping pace with school work.

Three items defined the third factor, also related to stress emanating from the school experience and estimated to account for around 4.3% of the variance. Two of those items were represented in scales from the original ASQ (stress of school attendance and stress of school performance) while the third item related to dissatisfaction with the need to rise early in the morning in order to attend school. Like the original ASQ factor, this factor too was therefore labeled *Stress of School Attendance*.

Adolescence is a time associated with the early development of romantic relationships (Zimmer-Gembeck, 2002) though these do not necessarily occur without the experience of stress (Brendgen, Vitaro, Doyle, Markiewicz, & Bukowski, 2002). Five new items collectively reflected this experience and defined a fourth factor estimated to account for around 9.0% of the variance. These items bore on difficulties associated with both the establishment and maintenance of romantic relationships in adolescence (including rejection) and was labeled *Stress of Romantic Relationships*.

Difficulties with the peer group were clearly reflected in the fifth factor defined by seven new items and estimated to account for around 8.5% of the variance. This factor was labeled *Stress of Peer Pressure*. Curiously, while interactions with the peer group have been theoretically linked to poor adolescent adjustment (Asher & Coie, 1990; Parker & Asher, 1993) this aspect of adolescent stress was not represented in the original ASQ and items only emerged following focus group preparation for the current revision.

The sixth factor returned to the school environment for its item content; it was defined by 7 new items estimated to account for around 10.0% of the variance. The defining items reflected difficult interactions with teachers and conflict between freedom and control in the school environment. The autonomy/control tension is a recognized source of challenge for adolescents (Beyers, Goosens, Vansant, & Moors, 2003; Deslandes, Potvin, & Leclerc, 2000). Interestingly, it was a factor not apparent in the original ASQ and was labeled *Stress of Teacher Interaction* in the revised instrument.

Concern regarding the future is similarly recognized for its capacity to challenge adolescents (Jessor, 1993; Repetti et al., 1999) and items reflecting this, and estimated to account for around 6.7% of the variance, defined the seventh factor. Two of these items were also represented in the original ASQ scale and though they were joined by a new item reflecting personal pressure to succeed, the original label, *Stress of Future Uncertainty*, was retained.

Factor eight represented the tension between educational obligations and the need for leisure time. A single item from each of three original ASQ factors (stress of school attendance, stress of school performance and stress of parental control) combined with three new items to define this factor which was estimated to account for around 9.2% of the variance. The factor was labeled *Stress of School/Leisure Conflict*.

Financial pressures defined the focus of the ninth factor which was estimated to account for around 8.7% of the variance. Four new items reflected the recognition that financial resources did not match material needs, and while this may simply be regarded as an expression of emerging consumerism, at least two of the items went beyond that to indicate a real concern with financial survival. The factor was labeled *Stress of Financial Pressure*.

The final factor,⁵ estimated to account for around 1.7% of the variance, directly addressed the emerging issues of responsibility in adolescence. It was defined by three new items and perhaps most directly of all new factors, reflects the transitional challenges of adolescence as the individual progresses from dependence to autonomy (Jessor, 1993). The label *Stress of Emerging Adult Responsibility* seemed the most apt for this factor.

As Table 2 showed, some modest correlations emerged between factors. This was expected given the method of factor rotation (oblique), and positive correlations, where they have emerged, simply suggested that some domains of stressor experience overlap. This phenomenon is recognized in the literature describing adult stressors (Swindle & Moos, 1992) and there is no reason to believe that domains of adolescent stressors will behave differently. It is not surprising, for example, that stress arising from peer pressure (Scale 5) is positively correlated with stress arising from teacher interaction (Scale 6) since acquiescence to peer pressure may in turn promote disruptive school behaviours. Negative correlations however may suggest that the experience of stressors in some domains is actually inconsistent with the experience of stressors in other domains. This too is broadly in line with notions of stressor domain inter-dependence, and while at first glance negative associations may appear curious it is nonetheless possible that behaviours connected with experience in one domain might act to impede the experience of stressors in another domain. Stress arising from school/leisure conflict was, for example, negatively correlated ($r = -0.37$) with stress of school performance. Behaviours associated with that former conflict, if they emphasized school responsibilities to the detriment of leisure, could easily promote good

⁵The single item factor on sibling disagreements actually occurred here.

school performance (and so reduce stress arising from that source) even though the conflict itself continued to act as a source of stress for some adolescents.

Importantly however, given that the 10 emergent factors clearly portrayed recognized dimensions of adolescent stressor experience both from a theoretical perspective and in relation to the existing empirical literature on adolescent stress, transformation into scales providing quantitative indices of stressor experience was undertaken and scale scores examined against possible measures of validity.

Demographic correlates of ASQ scales

Significant gender differences were evident in seven of the 10 scales (*Stress of Home Life, School Performance, Romantic Relationships, Peer Pressure, Future Uncertainty, School/Leisure Conflict and Emerging Adult Responsibility*) with girls reporting significantly higher levels of stressor exposure in each case than boys. This is consistent with gender differences reported for the original ASQ (Byrne et al., 1995) and with more recent literature on gender and stress, whether in adolescents (Jensen, Svebak, & Gotestam, 2004; Moulds, 2003) or generally (Elliott, 2001; Tamres, Janicki, & Helgeson, 2002; Matud, 2004). It is a finding which is consistent with the evidence on gender differences in the onset of such psychological disorders as major depression (Mazure & Maciejewski, 2003) and is well recognized in the historical literature (Henderson et al., 1981). While there are no immediate reasons to explain this clearly enduring effect, the fact that the (new) ASQ scales operate in a way which is entirely consistent with existing evidence gives real confidence that these represent meaningful dimensions of adolescent stressor experience.

Age related far less broadly to ASQ scales than did gender. There is a distinct view that the overall level of stressor exposure for adolescents is increasing (McNamara, 2000) but no evidence that this gross index co-varies with age. Nonetheless the possibility that qualitative differences in the stressor experience occur across the age span of adolescence must be countenanced. The present study indicated very small but significant associations between adolescents' age and ASQ scales reflecting home life, school performance, financial pressure and emerging adult responsibility, and a larger and more noticeable association between age and future uncertainty. The magnitude of associations in the first four instances is sufficiently small that they probably convey little real meaning though they certainly make sense; it is entirely to be expected that as adolescents gain a sense of autonomy with increasing age they will be more and more challenged by the constraining characteristics of their environments. The stronger association between age and uncertainty about the future definitely makes sense; as adolescents approach the time when they must become self-reliant adults the realization that their current activities may not have adequately prepared them for this is likely to become more pronounced and acute. Thus, what may be a minor concern for younger adolescents becomes a greater challenge for those approaching adulthood. Again therefore, though less obvious than with gender differences, associations of ASQ scales with age lend confidence to the validity of those scales.

Correlations of ASQ scales with measures of affect and self-esteem

Not surprisingly the two measures of affect (anxiety and depression) correlated strongly and positively with one another, and equally strongly and negatively with the measure of self-esteem.

More importantly however, all ASQ scales correlated moderately to strongly with measures of both depression and anxiety, and negatively with the measure of self-esteem.

Associations between the experience of adolescent stress and depression are now well established in the literature (Compas, Orosan, & Grant, 1993; McFarlane, Bellisimo, & Norman, 1995; Diaz et al., 2002; Deardorff, Gonzales, & Sandler, 2003; Deardorff et al., 2003; van der Wal, de Witm, & Hirasing, 2003), and clear and consistent associations between ASQ scales and depression emerging from the present study lend further confidence to claims of validity for those scales as measures of significant vulnerability in adolescence. The same can be said for adolescent stress and state anxiety in its various forms (Fimian & Cross, 1986; Oppedal & Roysamb, 2004; Turner & Lloyd, 2004; Wolfradt, Hempel, & Miles, 2003) which, coupled with the clear conceptual link between stress and anxiety (Mandler, 1994) further strengthen this claim to scale validity. While the evidence on adolescent stress and self-esteem has not been so widely presented, inverse associations between these two constructs are sufficiently clear (Byrne & Mazanov, 2001; Hall & Torres, 2002) to allow the consistent negative correlations which emerged from the present study between ASQ Scales and the self-esteem measure to be further claimed as an indication of the validity of those scales.

The possibility of bi-directionality of associations with ASQ scales, particularly with measures of affect, can not of course be discounted. Affect can influence both reporting of stressor experience and assessments of stressor impact (Tamres et al., 2002). Extensive work with adults suggests however that this is not a major source of error in cross-sectional results (Henderson et al., 1981), and while prospective data collection should be considered for later validation studies the present data continue to allow claims of concurrent validity for the ASQ scales.

Reliability of the ASQ scales

Internal reliabilities of ASQ scales were examined using Cronbach's Alpha coefficients (Cronbach, 1990). 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 0.8. This indicates good internal reliability for all scales and high reliability for most (Cronbach, 1990).

Test–retest reliability was examined in a sub-sample ($N = 105$) of the total sample over a single week time period. Scale test–retest correlations ranged between 0.68 (*Stress of Financial Pressure*) and 0.88 (*Stress of Home Life*). Gregory (1992) suggests that test–retest reliability, indicating the temporal stability of measured phenomena, should fall above 0.8 to be useful; this was so for seven of the 10 ASQ scales, with a further two coming close. He went on to indicate however (p. 110) that there are no absolute standards for this and tests with reliabilities of 0.7 or lower can still have utility as measures of individual differences. Indeed it is not unusual that self-reported financial stress may vary over time since in adolescence, real financial responsibilities are likely to be relatively minor and even small and short-term changes in circumstance (a new casual job or an allowance being paid, for example) may impart a somewhat different perception of this domain of adolescent experience.

Within this light it is reasonable therefore to claim that the ASQ scales present a reliable means of assessing the breadth of adolescent stressor experience reflected in the qualitative descriptions of the individual scales.

The ASQ—conclusions

The development of the ASQ has addressed the main concerns surrounding the past assessment of adolescent stress as described in the Introduction. The ASQ is not a measure of symptomatic distress though it does assess subjective stressor load. The item content was developed by talking with adolescents themselves and not by simply adapting adult inventories. And the item content seeks to cover the broad domains of adolescent stressor experience rather than focusing only on specific components of that experience. It can thus claim to be a broadly based instrument which allows adolescents to report their own exposure to a wide span of stressors and to report, as well, the extent to which any stressor experience has constituted a psychological challenge for them as individuals. The 10 scales reflect dimensions of adolescent stress which are qualitatively consistent with the contemporary literature on the stressfulness of adolescence (McNamara, 2000). And the ASQ undertakes the assessment of adolescent stress in an acceptably reliable fashion. The potential for the nature of adolescent stressors to change with time was recognized in the decision to up-date the original ASQ; this potential remains and not just the ASQ but all measures of adolescent stress should be used with this consideration in mind. We are confident however that the ASQ now being reported has complete relevance to its current time and that the need to review item content and language is not likely to be an issue for a further decade or more.

In an area where assessments of the psychometric properties of instruments are so often conspicuously absent the current work has sought to systematically address these. The ASQ consistently and noticeably relates to measures of emotional distress and of self-perceptions in ways which indicate that the instrument is a valid measure of stressor experience. Moreover the instrument shows good reliability both internally and across repeat testing. There are gender effects on ASQ scales but these are no different to what the existing literature on gender and both stress and affect would lead us to expect. And the lack of strong age correlates with ASQ scales suggests an instrument which has potential utility across the entire age span of adolescence.

No work has yet been undertaken on the capacity of the ASQ to predict adolescent health status or adjustment in prospective studies; this work is currently being planned. Work to examine relationships between ASQ scales and broader measures of psycho-social adjustment, emotional experience and academic performance is currently being undertaken. If it can be shown that such predictions are possible the conduct of these studies will give even greater weight to the validity of the ASQ. Moreover, since the capacity of scales of adolescent stress to cross boundaries of culture is not yet well understood, studies using the ASQ in the USA, and (in translated versions) in Norway and China are presently underway; data arising from these studies have the potential to inform both the further empirical use of the ASQ and the theoretical nature of adolescent stress. Even on the basis of the present data however it can be claimed that the ASQ holds considerable potential utility as a comprehensive measure of adolescent stress both in the research setting and in the context of clinical investigation.

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