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A Confirmatory Factor Analysis and Validation of the Vulnerable Attachment Style Questionnaire

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Abstract

Objective: The Vulnerable Attachment Style Questionnaire (VASQ; Bifulco, Mahon, Kwon, Moran & Jacobs, 2003) was developed to assess adult attachment as a vulnerability factor for developing depression and identified two subscales, insecure attachment and proximity-seeking. The present study sought to confirm and further validate the factor structure of the VASQ in a large community convenience sample.

Method: The VASQ was completed by a large sample of men and women ($N = 1236$) as part of an online survey. The data were randomly split to allow both independent exploratory (EFA) and confirmatory factor analyses (CFA) to be conducted.

Results: A four-factor model consisting of two types of proximity-seeking (*lack of autonomy* and *anxious-dependent*) and insecurity (*ambivalent* and *avoidant-dismissive*) attachment patterns proved to be the best-fitting measurement model in this sample ($\chi^2=186.7$, $df=71$, $p<.001$; CFI=.945, TLI=.929, RMSEA=.05). Although similar to the original questionnaire, the new factor structure resulted in the elimination of several items. Validity was confirmed with the shortened VASQ as similar associations with mood, stress, eating pathology and sex were observed for both the new shortened VASQ and original version of the VASQ.

Conclusions: The structure of the VASQ was broadly consistent with the original solution although some items were removed and both subscales were further split into two sub-factors. Future research should use this tool in clinical and non-clinical groups to provide further support for its factor structure and to determine the clinical and theoretical usefulness of the different subscales.

Keywords

Attachment

Vulnerable Attachment Style Questionnaire (VASQ)

Confirmatory Factor Analysis (CFA)

Disordered eating

Mood

Stress

Introduction

Attachment refers to the bond that develops between an infant and its caregiver to provide young children not only with a sense of security and to aid survival but to develop patterns of emotion regulation (Bowlby, 1977). Following observations of caregiver-infant interactions, Ainsworth, Blehar, Waters and Wall (1978) formulated the three types of attachment styles known as secure, anxious/ambivalent and avoidant, with the latter two referring to insecure attachment styles. The attachment between an infant and its caregiver can persist and even shape later affectional bonds formed during adulthood (Ainsworth, 1985). Hazan and Shaver's (1987) research suggests that the infant-caregiver attachment bond described by Ainsworth (1985) provides a plausible framework for understanding attachments formed in adulthood. Secure attachment patterns in adulthood characterise adults who are comfortable with getting close to and depending on others. However, those with an avoidant attachment style have difficulty trusting others and are uncomfortable with intimacy. Anxious/ambivalent adults worry that others do not really care about them and are often characterised as being highly dependent on others.

The theoretical foundations of attachment theory (Ainsworth et al., 1978; Bowlby, 1977) have been used to develop measures to assess patterns of attachment behavior in adulthood (see reviews: Crowell & Treboux, 1995; Lyddon, Bradford & Nelson, 1993; Ravitz, Maunder, Hunter, Sthankiya & Lancee, 2010). These include both interview-based and self-report assessments. Research demonstrates that securely attached individuals (as opposed to insecurely attached) develop the ability to self-

soothe and regulate their emotions (Sloman, Gilbert & Hasey, 2003). Therefore, measures assessing adult attachment styles have been used to evaluate the impact of adult attachments (specifically insecurity of attachment) on psychopathology including depression, anxiety, stress and eating disorders (e.g., Bifulco, Kwon, Jacobs, Moran, Bunn & Beer, 2006; Ditzen, Schmidt, Strauss, Nater, Ehlert & Heinrichs, 2008; Kidd, Hamer & Steptoe, 2011; Mickelson, Kessler & Shaver, 1997; Ward, Ramsay & Treasure, 2000; Zachrisson & Skårderud, 2010).

A review of adult attachment measures is beyond the scope of this report (for a full review see; Ravitz et al., 2010) but a brief summary of some of the key measures may be useful. The Adult Attachment Styles (AAS; Hazan & Shaver, 1987) is a categorical measure consisting of three short descriptions of adult attachment attitudes. Collins and Read (1990) used the individual statements of the AAS (Hazan & Shaver, 1987) to develop a continuous measure of adult attachment. Using factor analysis, these authors identified three types of attachment styles, trusting and depending on others (Depend dimension), relationship anxiety including fear of being abandoned (Anxiety dimension) and being comfortable with closeness and intimacy (Close dimension). Other measures of adult attachment styles include the Relationship Questionnaire (RQ; Bartholomew & Horowitz, 1991) and the Experiences in Close Relationships questionnaire (ECR; Brennan, Clark & Shaver, 1998). Although both of these measures assess secure, preoccupied, fearful and dismissing attachment styles, the ECR (Brennan et al., 1998) examines these four styles based on attachment-related anxiety and avoidance.

While a number of authors have sought to develop measures of attachment that identify theoretically meaningful styles, Bifulco, Mahon, Kwon, Moran and Jacobs (2003) argued that it is important to develop a measure which not only assesses the severity of vulnerable attachment in adulthood but one that can identify those at high risk for psychopathology such as depression. Based on the Attachment Style Interview (ASI; Bifulco, Moran, Ball & Bernazzani, 2002a; Bifulco, Moran, Ball & Lillie, 2002b) Bifulco et al. (2003) developed the Vulnerable Attachment Style Questionnaire (VASQ). This is a 22-item scale used to assess the degree of vulnerability to psychopathology due to attachment issues. Specifically two subscales were identified, labelled as 'Insecurity' and 'Proximity-seeking'. Insecurity was a stronger predictor of depression than was Proximity-seeking, although in some analyses the combined scores were stronger predictors of depression than either scale on its own (Bifulco et al., 2003). Other authors have also found that it is the Insecurity subscale rather than Proximity-seeking which is more strongly related to psychopathology. The Insecurity subscale is positively related to depressive symptoms, loneliness and detached mourning (an attitude that maintaining an emotional involvement with a close one who has died will hinder the mourning process) and negatively correlated with perceptions of competence, autonomy, relatedness and social support (Carr, Colthurst, Coyle & Elliott, 2012; Sochos & Bone, 2012).

Ravitz et al.'s (2010) systematic review of adult attachment measures suggests that the VASQ has good validity and reliability indicating that it is a promising measure and the authors recommend its further use and development. Its potential importance also

stems from the fact that Bifulco et al. (2003) demonstrated that it is a better predictor of the subsequent onset of depression than another widely used measure of attachment styles, the RQ (Bartholomew & Horowitz, 1991).

Clearly, further psychometric evaluation of the VASQ is warranted as to date, the original study (Bifulco et al., 2003) is the only study which has examined the psychometric properties of the VASQ. In addition, the original development of the VASQ was based on a sample of middle-aged women and their family members (Bifulco et al., 2003), thus limiting its generalizability to the general population. Therefore, the aim of the current study was to examine the factor structure using exploratory and confirmatory factor analyses in a large and diverse sample. It was hypothesized that based on Bifulco et al.'s (2003) study, a two-factor solution consisting of Insecurity and Proximity-seeking would be found with the current data. However, as other measures of adult attachment styles reflect between two and four types of attachment patterns, the current study will also explore three and four factor solutions of the VASQ. For example, the ECR (Brennan et al., 1998) differentiates between anxious and avoidance attachment behaviours, whilst the AAS (Collins & Read, 1990; Hazan & Shaver, 1987) and the RQ (Bartholomew & Horowitz, 1991) assess three and four types of adult attachment styles, respectively. There are many similarities between VASQ items and statements that have been used in these other measures to reflect different attachment patterns in adulthood. For example, the Insecurity scale of the VASQ includes items such as 'I find it hard to trust others' which correspond to 'I find it difficult to trust them' (Avoidant category; Hazan & Shaver, 1987). Similarly, the Proximity-seeking component

includes items such as 'I worry about things happening to close family and friends' which reflects 'I worry a lot about my relationships' (Anxiety category; Brennan et al., 1998).

In addition, the current study validated the VASQ in terms of its associations with mood, stress and eating disorder symptoms. In particular, associations between these constructs and the newly confirmed factor structure were compared with associations between these constructs and the original scoring method for the VASQ. Finally, as the original paper by Bifulco et al. (2003) and later studies (Carr et al., 2012; Doyle, McNamara, Cheevers, Finnegan, Logue & McEntee, 2010) which used the VASQ did not examine sex differences, the current study also explored any differences that may be present between men and women when assessing adult attachment patterns using the VASQ. Although, Scohos and Bone (2012) did find that gender was associated with the Proximity-seeking subscale but not with the Insecurity subscale. Also, based on previous studies (Kobak & Hazen, 1991; Roberts, Gotlib & Kassel, 1996) using other adult attachment measures it is hypothesized that women will indicate more attachment insecurity compared to men.

In summary, it is plausible that the VASQ contains one, two, three or four factors. The aim of the present study is to confirm the factor structure of the VASQ, explore the relationship between the VASQ and other psychological constructs such as mood, stress and disordered eating behaviours, and examine sex differences using data gathered from a large predominantly community-based sample.

Method

Participants and procedure

Participants were recruited as part of a longitudinal study investigating stress, mood, bodyweight and disordered eating ($N = 1236$). Participants were recruited from several sources including social networking sites and health and well-being forums and at the University of Hertfordshire. Participants completed the survey online which was created using the Bristol Online Survey (BOS; University of Bristol, 2010) facility. For the overall sample, mean age was 28.7 (s.d 10.7) and most participants were female, white, either employed or were students and either single or married/in a relationship (see Table 1).

Measures

Primary Measure: Attachment

The VASQ (Bifulco et al. 2003) is a 22-item scale assessing behaviors, emotions and attitudes relating to adult attachment. Participants are asked to rate each statement on a 5-point Likert scale (“Strongly disagree” to “Strongly agree”). The VASQ can be used to compute a total score reflecting vulnerable attachment and two separate subscales indicating insecure and proximity-seeking attachment patterns. Items 14 and 15 were positive items and so were reversed in order to be scored consistently with other vulnerable attachment items. Higher scores indicate a more vulnerable attachment when computing a total score and more insecurity and proximity-seeking attachment when using the subscales. Cronbach’s alpha for the overall VASQ and its subscales,

insecurity and proximity-seeking, in the current study were $\alpha = .79$, $\alpha = .82$ and $\alpha = .73$, respectively, which are similar to the Cronbach's alpha's reported for the insecurity ($\alpha = .82$) and proximity-seeking ($\alpha = .67$) scales by Bifulco et al., (2003).

Mood

Mood was assessed using the Short Depression-Happiness Scale (SDHS; Joseph, Linley, Harwood, Lewis & McCollam, 2004). The SDHS (Joseph et al. 2004) consists of 6 statements, which requires participants to rate how they have felt over the last 7 days on a 4-point Likert scale ("Never" to "Often"). The SDHS (Joseph et al. 2004) is a bi-directional scale with lower scores indicating low mood and higher scores indicating happiness. Cronbach's alpha for the SDHS (Joseph et al. 2004) in the present sample was .88.

Disordered Eating Behaviors

Disordered eating was assessed using the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994). The EDE-Q (Fairburn & Beglin, 1994) is a 36-item questionnaire consisting of 4 subscales assessing dietary restraint and weight, shape and eating concerns. Of the 36 items, 22 are rated on a 7-point Likert scale from "No days" to "Every day". From the remaining 14 items are diagnostic rather than continuous and were not included in the present analysis. Only the total EDE-Q score is reported here. Cronbach's alpha for the EDE-Q (Fairburn & Beglin, 1994) in the current sample was $\alpha = .94$.

Stress

Stress was assessed using the Perceived Stress Scale-4 (PSS-4; Cohen & Williamson, 1988), a 4-item measure of stress perceptions. Individuals were required to rate on a 5-point Likert scale (“Very often” to “Never”) the degree to which they appraise situations as stressful with higher scores indicating greater perceptions of stress. Cronbach’s alpha for the PSS-4 (Cohen & Williamson, 1988) in the present sample was .80.

Statistical analysis

The data were randomly split to perform Exploratory Factor Analysis (EFA) using the first half of the randomly split dataset (the training sample, $n = 602$) in Mplus version 6 (Muthén & Muthén, 2010). Oblique Geomin rotation was employed since the extracted factors were expected to correlate. A number of methods were used to determine the appropriate number of factors to extract. These were the Kaiser criterion (eigenvalues > 1), scree plot, optimal co-ordinates, acceleration factor and comparison data method. This was undertaken in R using the nFactors package (Raiche & Magis, 2011) and the comparison data method described by Ruscio and Roche (2012). Items were removed from the EFA if their factor loadings were non-significant or if they loaded significantly but weakly (i.e., $< .40$) onto more than one factor.

The best fitting models identified from the EFA (after removal of non-significant and double loadings) were subsequently selected for Confirmatory Factor Analysis (CFA)

using the second half of the dataset (the testing sample, $n = 634$) from which post-hoc modifications could be sought and evaluated.

CFA was conducted using Mplus version 6 (Muthén & Muthén, 2010) with analyses computed using the Maximum Likelihood estimator (ML) as responses were approximately normally distributed. Mplus (Muthén & Muthén, 2010) generates several fit indices to assess how well the proposed model fits the sample data. Firstly, the χ^2 statistic may be used as a measure of fit between the sample covariance and fitted covariance matrices (Byrne, 1998). Although a non-significant χ^2 is desired, due to the large sample size of the current study, a significant χ^2 is expected based on standard statistical theory of how sample size, power and significance are associated (Cohen, 1992). Therefore, in addition to the χ^2 statistic several fit indices were evaluated including the Bayesian Information Criterion (BIC), Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI). The model with the lowest BIC is preferred (Raftery, 1995) and values $> .95$ for the CFI and TLI indicate a reasonable fit (Hu & Bentler, 1999). The Root Mean Square Error of the Approximation (RMSEA) is another fit index which takes into account the error of approximation in the population (Byrne, 1998). RMSEA values $< .05$ indicate a good model fit (Hu & Bentler, 1999). Composite Reliability (ρ) was used as a measure of internal reliability (ρ values $> .70$ indicate good internal reliability; Bacon, Sauer & Young, 1995).

Similar to the original paper by Bifulco et al. (2003), further analyses were conducted to examine associations between the subscales of the VASQ and mood. Associations between the VASQ and disordered eating and stress were performed in order to

validate the measure further. Additional analyses were also conducted to examine sex differences as a test of concurrent validity for each of the subscales. Effect sizes as measured by Cohen's d were also reported with .20, .50 and .80 representing small, medium and large effects, respectively (Cohen, 1992).

Results

Sample characteristics

The data set of 1236 participants was randomly split into two training and testing samples from which EFA ($n = 602$) and CFA ($n = 634$) were conducted. Comparisons between the training and testing samples with regards to demographic variables are shown in Table 1. The two groups did not differ with respect to age, BMI, gender, ethnicity, marital and employment status. Furthermore, individual scores on the Proximity-seeking and Insecurity scales of the VASQ and the SDHS, EDE-Q and PSS-4 did not differ between the groups (p values range between .11 to 1.0). These results suggest that the random split was successful, allowing two independent samples to be analysed.

Table 1 about here

Exploratory Factor Analysis of the VASQ

Models extracting between 2 and 4 factors were considered based on the indication of the scree plot (elbows at 2 and 4 factors), acceleration factor (2 factors) optimal co-ordinates (4 factors), parallel analysis (4 factors) and comparison data

method (4 factors). Six eigenvalues were observed to be greater than one, however the Kaiser criterion is known to over extract the number of factors (Fabrigar, 1999) and eigenvalues for the fifth and sixth factors were close to one so were not considered. The two factor EFA model revealed the expected insecurity and proximity-seeking structure, however the fit of the model was poor using standard SEM criteria ($\chi^2=946.5$, $df=188$, $p<.001$; $BIC=37917.198$, $CFI=.765$, $TLI=.711$, $RMSEA=.08$). The three factor EFA model split the proximity-seeking scale into separate factors, but still exhibited poor model fit ($\chi^2=982.3$, $df=168$, $p<.001$; $BIC=37781.035$, $CFI=.840$, $TLI=.781$, $RMSEA=.07$). The four factor model further split the insecure factor into two subscales ($\chi^2=513.3$, $df=149$, $p<.001$; $BIC=37733.595$, $CFI=.887$, $TLI=.825$, $RMSEA=.06$). The fit of the four factor model was still outside acceptable limits but was chosen for further analysis because it provided closer fit to the data than the two or three factor solutions, the pattern of loadings made theoretical sense and the extraction of four factors was indicated by both the parallel analysis and comparison data methods, which have been shown to perform well in simulation studies (Ruscio & Roche, 2012).

Using the criteria outlined above, items 1 (“I take my time getting to know people”), 3 (“People let me down a lot”), 9 (“People close to me often get on my nerves”) and 17 (“I feel uneasy when others confide in me”) from the original Insecurity scale and items 4 (“I miss the company of others when I am alone”), 14 (“I look forward to spending time on my own”) and 21 (“Its important to have people around me”) from the Proximity-seeking scale were excluded. Based on the four-factor structure, items 3, 4, 17 and 21 were removed as their factor loadings were weak ($<.40$) while items 1, 9

and 14 were eliminated due to both weak factor loadings (<.40) and double loadings thus limiting their interpretation. The four-factor solution was re-estimated after excluding these items and the fit of the model was within acceptable limits ($\chi^2=98.1$, $df=51$, $p<.001$; $BIC=25951.783$, $CFI=.978$, $TLI=.955$, $RMSEA=.04$). The loading pattern was similar to the original solution described by Bifulco et al. (2003) but with the original Insecurity and Proximity-seeking scales each split into two further subscales and item 13 (“I am clingy with others”) loading onto one of the insecurity subscales instead of a proximity-seeking subscale. Of the two subscales that split from the original proximity-seeking subscale, one reflected overreliance and difficulty making decisions while the other reflected dependence and fear of abandonment. These were labelled *lack of autonomy* (common variance explained = 19.8%) and *anxious-dependent* (common variance explained = 20.7%), respectively. Of the two subscales that split from the original insecure subscale, one reflected dismissiveness and mistrust, while the other reflected antagonism and clinginess. These were labelled *avoidant-dismissive* (common variance explained = 29.6%) and *ambivalent* (common variance explained = 30.0%), respectively. The rotated Geomin factor solution can be seen in table 2.

Table 2 about here

Confirmatory Factor Analysis of the VASQ

Firstly, the original factor structure proposed by Bifulco et al. (2003) was examined in the testing sample and revealed poor fit to the data since all fit indices were outside their recommended cut-off ranges (see model A, Table 3).

Table 3 about here

Following the exclusion of several items (see above), the four-factor model derived from the EFA was evaluated in the testing sample using CFA. This model (model B) demonstrated a reasonable fit to the data as evidenced by the fit indices (see Table 3). However, there were issues regarding item 13, as in the EFA solution: item 13 loaded onto the *Ambivalent* factor but the modification indices (MI) ranged between 20.73 to 65.22, suggesting this item should also load on the other three factors. Given the multiple loading of item 13 and, as the wording of this item seemed to be best described by the *Ambivalent* subscale, a further CFA was carried out removing item 13 completely (see model C, Table 3). The fit indices of this modified model were within acceptable levels (see model C, Table 3).

Figure 1 about here

While a four-factor solution has been found here, the original factor structure described by Bifulco et al. (2003) suggests that a two-factor solution, combining the two Proximity-seeking subscales (*Lack of autonomy* and *Anxious-dependent* [6 items]) and the two

Insecurity subscales (*Avoidant-dismissive* and *Ambivalent* [8 items]) identified here, might also be sufficient. This alternative higher-order model was tested and revealed a slight decline in all fit indices but still had a reasonable fit to the data, providing support for Bifulco et al.'s (2003) two-factor structure (see model D, Table 3), albeit with a smaller number of items ($n = 14$). The higher-order model is shown in figure 1 accompanied by standardised model coefficients.

Composite reliabilities (ρ) for the four subscales of *Lack of autonomy*, *Anxious-dependent*, *Avoidant-dismissive* and *Ambivalent* in the modified VASQ were .69, .67, .79 and .64, respectively. In addition, and similar to the original study by Bifulco et al. (2003), internal reliabilities were calculated for the shortened 14-item version of the VASQ by combining the *Lack of autonomy* and *Anxious-dependent* subscales to create the Proximity-seeking scale and the *Avoidant-dismissive* and *Ambivalent* to create the Insecurity scale. Composite reliabilities for the Proximity-seeking ($\rho = .55$) and Insecurity ($\rho = .82$) scales show that the Proximity-seeking scale is outside of the reasonable threshold ($\rho < .70$; Bacon et al., 1995).

VASQ: Intercorrelations with mood, disordered eating, stress and gender differences

High intercorrelations were found between the subscales of the original 22-item and the new 14-item version of the VASQ. The Insecurity subscales taken from the two versions correlated at .97 ($p < .001$) and the Proximity-seeking subscales correlated at .91 ($p < .001$). Table 4 shows the intercorrelations between the VASQ subscales for the original 22-item version and the new shortened 14-item version of the VASQ. Significant

correlations were found between the Insecurity and Proximity-seeking scales for both the original 22-item version and the new shortened 14-item version of the VASQ. Significant correlations are present between the two Proximity-seeking subscales and the two Insecurity subscales for the 14-item VASQ and between the individual subscales except between the *Lack of autonomy* and *Avoidant-dismissive* subscales ($p = .81$). As expected, smaller correlations are present between the subscales of the Insecurity scale and the subscales of the Proximity-seeking scale highlighting that these are distinct patterns of adult attachment.

Table 4 about here

Correlations between the SDHS, EDE-Q and PSS-4 and the Proximity-seeking and Insecurity scales of the VASQ were very similar for both the original 22-item and the new 14-item versions. High scores on the Proximity-seeking and Insecurity scale were associated with lower scores on the SDHS and higher scores on the EDE-Q and PSS-4. Significant correlations between the SDHS, EDE-Q and PSS-4 and the individual subscales of the 14-item version of the VASQ were found (Pearson r 's ranging from $-.47$ to $.41$). Women scored higher on both the overall Proximity-seeking scale and its subscales (*Lack of autonomy* and *Anxious-dependent*) than men for the 14-item version of the VASQ but did not differ significantly for the Insecurity scale or its subscales. These differences are consistent with the results for the full 22-item VASQ (see Table 5). Cohen's d was calculated as a measure of effect size which revealed small to large

(Cohen, 1992) effect sizes, with medium effects for the proximity-seeking scale (and its subscales) and large effects for the EDE-Q.

Table 5 about here

Discussion

An EFA and CFA were conducted to determine the factor structure of the VASQ in a large and demographically diverse sample. To our knowledge the only study that has previously examined the factor structure of the VASQ is the original paper in which the measure was developed (Bifulco et al., 2003). Current findings indicate that the VASQ measures four factors, two types of proximity seeking, labelled *Lack of autonomy* and *Anxious-dependent* and two types of Insecurity of attachment, labelled *Avoidant-dismissive* and *Ambivalent*. *Lack of autonomy* and *Anxious-dependent* differ as forms of proximity-seeking in that the former refers to relying on the attachment figure for help and support whereas the latter refers to anxiety over the attachment figure's absence. *Avoidant-dismissive* and *Ambivalent* differ as forms of Insecurity in that the former has a focus on one's internal emotional state in relation to others whereas the latter has a focus on the expectations of the individual and interactions with the attachment figure. This is similar to Bifulco et al.'s (2003) original findings but with the two attachment subscales each splitting into two further subscales. The analyses revealed that several modifications were required to achieve a good fit. These included the removal of several items due to low factor loadings and/or double loadings. The results also showed that a

two-factor solution could be created by combining the two Proximity-seeking subscales (*Lack of autonomy* and *Anxious-dependent*) together and the two Insecurity subscales (*Avoidant-dismissive* and *Ambivalent*) together (should researchers prefer). Although combining the subscales together to create a two-factor solution does not show a detrimental effect on the psychometric quality of the VASQ, researchers should be cautious when combining these subscales as the Proximity-seeking scale of the 14-item solution was found to have low composite reliability which can present some challenges. A reason for low reliability found for the Proximity-seeking scale could be due to the small number of items that were retained following EFA and CFA. Elimination of several items during EFA and CFA can pose a threat to the validity of the measure. However, the original structure of the VASQ was maintained with both two- and four-factor solutions producing the same two Insecurity and Proximity-seeking subscales in this sample providing further support for Bifulco et al.'s (2003) original model and also increasing its specificity. This is evidenced further by the fact that the effect size between the original and the modified VASQ scales with other psychological constructs are equivalent in size, thus suggesting that construct validity is maintained with the removal of eight items.

The original 22-item and the new 14-item versions performed almost identically in terms of intercorrelations between the Proximity-seeking and Insecurity scales (demonstrating high construct validity) and in their associations with mood, disordered eating, stress and sex. In terms of the more specified four-factor solution, while Bifulco et al. (2003) reported an association between depression and the Insecurity scale but

not the Proximity-seeking scale, the present study found that mood was associated with both Insecurity and Proximity-seeking scales, although the correlations between the Insecurity scales and mood were larger compared to those between the Proximity-seeking scales and mood. All scales and subscales were associated with disordered eating and perceptions of stress. Finally, sex differences were found for the overall Proximity-seeking scale for both the 14-item and 22-item versions of the VASQ and its subscales (*Lack of autonomy* and *Anxious-dependent*) with women reporting less autonomy and more dependence on others than men. Similarly, research using the VASQ has found that gender is associated with Proximity-seeking subscale but not with the Insecurity subscale (Sochos & Bone, 2012). Studies using other measures of attachment styles have shown that men report feeling more comfortable with getting close to others than do women (Roberts et al., 1996) and married men report themselves to be less reliant on their wives (Kobak & Hazen, 1991). In support of these findings, effect size analyses revealed that there is a medium effect of sex on proximity-seeking behaviours. Also, in line with previous research, a very large effect of sex on disordered eating behaviours were found with women reporting more dysfunctional eating behaviours compared to men (e.g., Lewinsohn, Seeley, Moerk & Striegel-Moore, 2002). Additionally, the associations between the VASQ and psychopathology and sex are maintained and further highlight the predictive validity of the VASQ when using a psychometrically improved version identified through CFA.

Strengths and limitations

The current study recruited a non-clinical sample and responses from a clinical group may have revealed a different factor solution. Another possible limitation is that the data were collected online and it is arguable that the use of traditional paper-and-pencil methods of data collection may have led to a different set of results. However, previous research has demonstrated that online responses are generally as valid and reliable as those collected offline (Hiskey, 2002).

The present study has noteworthy strengths, for example the recruitment of a large predominantly community-based sample. This not only provided the analyses with good power but also allows the findings to be generalised to groups outside of the sample of middle-aged women and their family members with which the VASQ was originally developed. Nevertheless, the sample in the present study was predominantly white and female and therefore was not entirely representative of the general population. A caveat of these findings is that further testing should be conducted before this measure is used in older adults, as the mean age of the present sample was 29 years old. In addition, associations with mood, disordered eating and stress were cross-sectional rather than longitudinal, in contrast to the association between onset of depression and the VASQ in Bifulco et al.'s (2003) study. Finally, as very few items were found to load onto the Proximity-seeking scale and its subscales, the overall reliability of this component of the measure was compromised.

Implications

Notwithstanding the above limitations, our findings have a number of important implications. From a theoretical point of view, the present study supported the original findings of Bilfulco et al. (2003), indicating that a two-factor structure consisting of insecurity of attachment and proximity-seeking patterns provides a suitable fit. Furthermore, the discovery that the two original scales can be split into two further subscales in order to differentiate between avoidant-dismissive and ambivalent types of insecure attachment and lack of autonomy versus anxious-dependent types of proximity-seeking attachment patterns is potentially important. Although measures of attachment in adulthood label attachment patterns differently, there are similarities between measures such as the number of attachment patterns that are found and the items that reflect each style. Therefore, the finding that the two original VASQ scales split into two further subscales each is similar to other (and more widely used) adult attachment measures (e.g., Bartholomew & Horowitz, 1991; Brennan et al., 1998; Collins & Read, 1990; Hazan & Shaver, 1987). Similarities between the four attachment patterns derived from the VASQ are also similar to those described by other measures of adult attachment. For example, the anxious-dependent component of proximity-seeking reflects a combination of the items that reflect the anxious and depend categories by Collins and Read (1990) and anxiety items from the ECR (Brennan et al., 1998). The avoidant-dismissive component of the insecurity of attachment scale contains items that are similar to the dismissive-avoidant category reflected in the RQ (Bartholomew & Horowitz, 1991).

Furthermore, the use of both two- and four-factor models of the VASQ will allow future research to build on our current understanding of these attachment patterns and how these separable attachment styles can impact differently on outcomes and/or respond differently to intervention. These four attachment patterns are clearly separable aspects of adult attachment styles but the degree to which this distinction is clinically and/or theoretically meaningful requires further investigation. The demonstration of reliability and validity of the VASQ supports its future use by both researchers and clinicians to evaluate those who are at high risk for psychopathology such as depression, anxiety, stress and eating disorders.

Future research should explore the associations between the VASQ and other measures of attachment. For example, the Avoidant-dismissive versus Ambivalent subtypes of Insecure attachment found here may be related to the model-of-self versus model-of-other scales that can be calculated in the RQ (Bartholomew & Horowitz, 1991). Whether the modified VASQ reported here outperforms other attachment measures in predicting psychopathology (as was found in Bifulco et al.'s (2003) study) also requires confirmation.

The current study has built on the original development of the VASQ. Specifically, it has expanded its generalisability by using a large, predominantly community-based sample. However, in order to develop the VASQ further, emphasis must be placed on using this potentially valuable tool in other settings in order to demonstrate its generalisability to a range of diverse clinical and non-clinical groups and provide further support for its two- and four-factor structure.

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Table 1: Demographic variables across EFA and CFA split sample

Variable	Total (<i>n</i> = 1236)	EFA Sample (<i>n</i> = 602)	CFA Sample (<i>n</i> = 634)
Age (<i>SD</i>)	28.7 (10.7)	28.7 (10.8)	28.7 (10.7)
Male % (<i>n</i>)	20.2 (250)	19.1 (115)	21.3 (135)
Female % (<i>n</i>)	79.8 (986)	80.9 (487)	78.7 (499)
Ethnicity (<i>n</i>)			
White %	75.4 (932)	75.4 (454)	75.4 (478)
Other %	24.6 (304)	24.6 (148)	24.6 (156)
Marital status % (<i>n</i>)			
Single	39.0 (482)	38.7 (233)	39.3 (249)
Married	21.1 (261)	21.9 (132)	20.3 (129)
In a relationship	22.6 (279)	22.4 (135)	22.7 (144)
Living with a partner	13.5 (167)	13.1 (79)	13.9 (88)
Divorced	3.3 (41)	3.5 (21)	3.2 (20)
Widowed	.5 (6)	.3 (2)	.6 (4)
Employment % (<i>n</i>)			
Student	50.3 (622)	50.8 (306)	49.8 (316)
Employed	41.3 (510)	40.5 (244)	42.0 (266)
Unemployed	4.9 (60)	5.5 (33)	4.3 (27)
At home with children	2.5 (31)	2.5 (15)	2.5 (16)
Retired	1.1 (13)	.7 (4)	1.4 (9)
BMI (<i>SD</i>)	24.9 (6.2)	25.0 (6.0)	24.8 (6.3)
SDHS (<i>SD</i>)	11.8 (4.2)	12.0 (4.2)	11.6 (4.2)
EDE-Q (<i>SD</i>)	2.0 (1.4)	2.0 (1.5)	1.9 (1.4)
PSS-4 (<i>SD</i>)	7.2 (3.4)	7.1 (3.3)	7.2 (3.5)
<u>22-item VASQ</u>			
Insecurity (<i>SD</i>)	31.9 (7.6)	31.8 (7.4)	31.9 (7.7)
Proximity-seeking (<i>SD</i>)	29.0 (5.9)	29.0 (6.0)	29.0 (5.9)

Note. SDHS = Short Depression-Happiness Scale; EDE-Q = Eating Disorder Examination Questionnaire; PSS-4 = Perceived Stress Scale-4

Table 2: EFA solution of the VASQ

No.	Item	Factor				Communalities
		1	2	3	4	
2	I rely on others to help me make decisions	.83	.01	.14	.24	.50
7	I usually rely on advice from others when I've got a problem	.67	-.09	.29	.20	.50
15	I like making decisions on my own*	.54	-.10	.13	.17	.25
5	It's best not to get too emotionally close to other people	.002	.63	.12	.35	.38
8	I feel uncomfortable when people get too close to me	.01	.75	.14	.29	.41
18	I find it hard to trust others	-.09	.65	.19	.37	.65
19	Having people around me can be a nuisance	-.11	.51	.09	.40	.24
22	I find it difficult to confide in people	-.10	.63	.08	.23	.49
6	I worry a lot if people I live with arrive back later than expected	.14	.10	.67	.22	.37
11	I worry about things happening to close family and friends	.04	.15	.57	.22	.31
16	I get anxious when people close to me are away	.19	.19	.68	.49	.60
10	I feel people are against me	.19	.43	.26	.69	.61
12	I often get into arguments	.11	.24	.23	.55	.25
13	I am clingy with others†	.29	.06	.38	.57	.22
20	I feel people haven't done enough for me	.07	.33	.16	.62	.28
Eigen value		3.84	2.31	1.43	1.16	

Note. *Item 15 was reverse coded; †Item 13 was excluded during CFA; Items loading onto the relevant factor are indicated in bold; Factor labels are: 1 = Lack of autonomy; 2 = Avoidant-dismissive; 3 = Anxious-dependent; 4 = Ambivalent

Table 3: Summary of the CFA results for the several VASQ models and fit indices

Model		Chi²	No of free Parameters	df	p-value	BIC	CFI	TLI	RMSEA
A	Original VASQ	1407.2	67	208	<.001	39895.112	.675	.639	.095
B	VASQ from EFA	303.6	51	84	<.001	27191.946	.905	.881	.064
C	Modified model (Item 13 removed)	186.7	48	71	<.001	25376.599	.945	.929	.051
D	Higher-order model	212.0	45	74	<.001	25382.604	.934	.919	.054

Table 4: Intercorrelations between the VASQ subscales and psychopathology scores ($N = 1236$)

<u>22 Item VASQ</u>						
	Insecurity	Proximity-seeking	SDHS	EDE-Q		
Proximity-seeking	.16**					
SDHS	-.54**	-.19**				
EDE-Q	.33**	.18**	-.46**			
PSS-4	.45**	.31**	-.71**	.39**		

<u>14 Item VASQ</u>						
	Insecurity	Proximity-seeking	Avoidant-dismissive	Ambivalent	Lack of autonomy	Anxious-dependent
Proximity-seeking	.22**					
Avoidant-dismissive	.93**	.14**				
Ambivalent	.77**	.28**	.47**			
Lack of autonomy	.05	.76**	-.01	.13**		
Anxious-dependent	.29**	.80**	.22**	.30**	.21**	
SDHS	-.54**	-.22**	-.46**	-.47**	-.15**	-.18**
EDE-Q	.34**	.21**	.30**	.27**	.14**	.19**
PSS-4	.44**	.33**	.37**	.41**	.24**	.27**

Note. ** $p < .001$; SDHS = Short Depression-Happiness Scale; EDE-Q = Eating Disorder Examination Questionnaire; PSS-4 = Perceived Stress Scale-4

Table 5: Means (Standard Deviation in brackets) for participant's age, BMI, SDHS, EDE-Q, PSS-4 and VASQ scores for the 22- and 14-item versions as a function of sex ($N = 1236$)

Variable	Men ($N = 250$)	Women ($N = 986$)	Significance	Cohen's d
Age	29.6 (11.3)	28.5 (10.6)	$t(1222) = 1.46, p = .15$.08
BMI	25.4 (5.6)	24.8 (6.3)	$t(417.45) = 1.67, p = .10$.16
SDHS	12.4 (4.2)	11.6 (4.2)	$t(1234) = 2.66, p = .01$.15
EDE-Q	1.3 (1.2)	2.1 (1.4)	$t(469.89) = -9.26, p < .001$	-.85
PSS-4	6.5 (3.5)	7.3 (3.3)	$t(1234) = -3.37, p = .001$	-.19
<u>Original 22-item VASQ</u>				
Insecurity	31.4 (7.5)	32.0 (7.6)	$t(1234) = -.98, p = .33$	-.06
Proximity-seeking	27.1 (5.9)	29.5 (5.8)	$t(1234) = -5.91, p < .001$	-.34
<u>New 14-item VASQ</u>				
Two-factor solution				
Insecurity	20.2 (5.7)	20.4 (5.8)	$t(1234) = -.59, p = .56$	-.03
Proximity-seeking	16.0 (4.0)	18.0 (4.0)	$t(1234) = -7.01, p < .001$	-.40
Four-factor solution				
Insecurity				
<i>Ambivalent</i>	6.7 (2.5)	6.6 (2.5)	$t(1234) = .33, p = .75$.02
<i>Avoidant-dismissive</i>	13.5 (4.2)	13.8 (4.2)	$t(1234) = -1.01, p = .32$	-.06
Proximity-seeking				
<i>Lack of autonomy</i>	7.5 (2.4)	8.5 (2.5)	$t(1234) = -5.56, p < .001$	-.32
<i>Anxious-dependent</i>	8.5 (2.5)	9.5 (2.7)	$t(1234) = -5.30, p < .001$	-.30

Note. SDHS = Short Depression-Happiness Scale; EDE-Q = Eating Disorder Examination Questionnaire; PSS-4 = Perceived Stress Scale

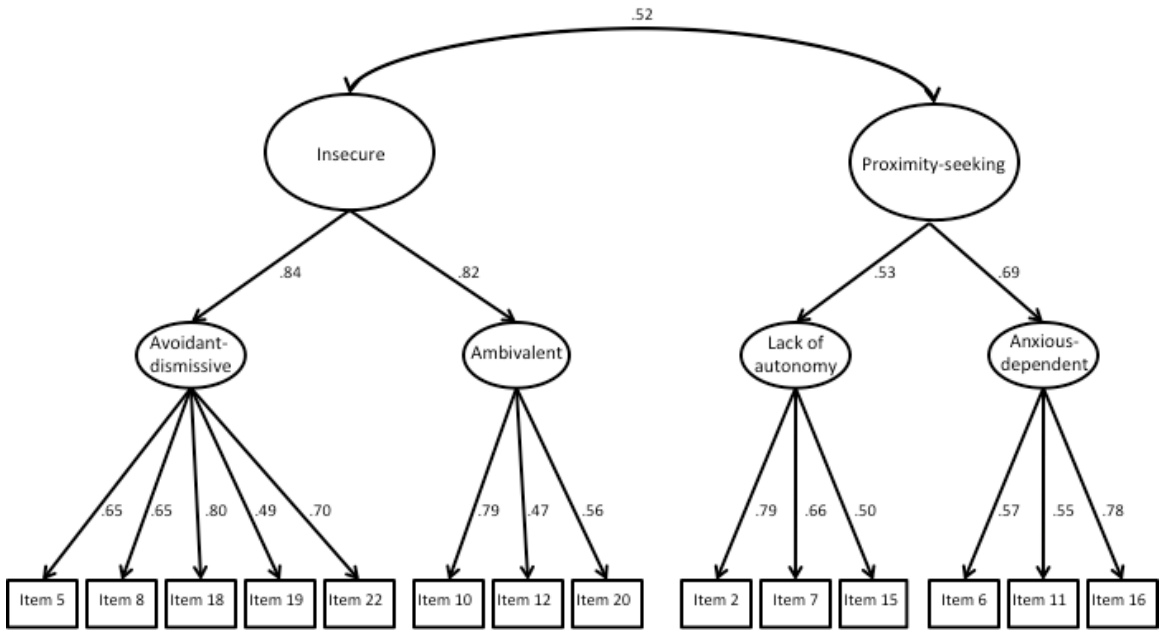


Figure 1: CFA: Higher-order VASQ model

Note. All standardised coefficients are significant at $p < .001$