Development and validation of a brief form of the childhood adversities questionnaire (CECA.Q3-BF) among a population of mood disorders

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Declaration of Conflict of Interests

The authors declared no conflict of interest.

Author contributions

TC and NL conducted the data collection. ML conducted the data analysis and prepared the draft of this manuscript, with XM's feedback on all steps of analysis,

interpretation, and manuscript drafting. CD assisted with the interpretation of results. All authors contributed to the writing and editing of the manuscript and have approved the final article.

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Abstract

Study questions. Childhood adversities have significant negative consequences on physical and mental health. The Childhood Experience of Care and Abuse Questionnaire 3 (CECA.Q3) interview, as an extended version of the CECA.Q, is widely used in the assessment of childhood adversities. Although its reliability and validity have been demonstrated, the application of CECA.Q3 is limited due to its intensive and lengthy interview. This paper aimed to develop and validate a brief form of the CECA.Q3 (CECA.Q3-BF) among a population of mood disorders.

Subjects. Data analyzed were from a clinical sample of 210 patients with mood disorders. **Methods.** Data were randomly split into training and testing datasets. The training dataset was used for scale reduction by applying principal component factor analysis, while the testing one was used for cross-validation to examine if the CECA.Q3-BF could have a good yield of accuracy. The optimal cut-off points of the CECA.Q3 were also tested.

Findings. Overall, four out of eight subscales had items reduction without compromising their accuracy of measurements for childhood adversities. They are *Antipathy* (reduced 4 items), *Neglect* (5 items), *Psychological abuse* (15 items), and *Role reversal* (11 items). The CECA.Q3-BF removed 35% items (35/100) from the full CECA.Q3. The accuracy of CECA.Q3-BF was validated in the testing dataset.

Major implications. The CECA.Q3-BF offers a brief but good accuracy of measure for childhood adversities. Future studies are warranted to further validate this brief

form. The CECA.Q3-BF is expected to improve the application of CECA.Q3 in clinical and epidemiological surveys, as it significantly reduces the length of the interview and therefore has better compliance.

Key words: childhood adversity, CECA.Q3, mood disorders, measurement tool, brief form

Introduction

Childhood adversities are defined as "*exposures during childhood or adolescence to environmental circumstances that are likely to require significant psychological, social, or neurobiological adaptation by an average child and that represent a deviation from the expectable environment*" (McLaughlin, 2016). The expectable environment refers to a variety of environmental inputs that the human brain requires to develop normally, such as sensory inputs, exposure to language, and the presence of a sensitive and responsive caregiver (Fox, Levitt, & Nelson, 2010).

Exposure to childhood adversities, for example, child abuse and neglect, exposure to violence, and family economic hardship is common across the world. It was estimated that about 50% of participants in the U.S. had adverse childhood experiences across various epidemiological surveys (Green et al., 2010; Kessler, Davis, & Kendler, 1997; McLaughlin, Conron, Koenen, & Gilman, 2010; McLaughlin et al., 2012). Nearly 85% of young people reported experiencing at least one adversity during their childhood in the Russian Federation (Kachaeva, Sethi, Badmaeva, Novozhilov, & Ivanov, 2014). The WHO World Mental Health Surveys documented a similar prevalence of childhood adversities in high-income (38%), high-middle-income (39%), and low- and lower-middle-income countries (39%) (Kessler et al., 2010).

Childhood adversities in the form of childhood maltreatment and household dysfunction have been investigated as a significant risk for both physically and psychologically negative consequences. Adverse childhood experiences have been

linked to numerous health behaviors and conditions, including smoking, obesity, diabetes, risky HIV behavior, and cardiovascular disease (Champbell, Walker, & Egede, 2016; Centre on the Developing Child, 2007; Pedersen, 2018). Exposure to early life adversities increases the risk of having a wide variety of subsequent psychiatric disorders, such as mood disorders, anxiety, substance use, psychotic experiences, personality disorders, disruptive behavior disorders, and even antisocial behaviors (Afifi, 2012; Afifi et al., 2011; Braga, Gonçalves, Basto-Pereira, & Maia, 2017; Green et al., 2010; Li, D'Arcy, & Meng, 2016; McGrath et al., 2017; McLaughlin et al., 2012). A dose-response relationship between childhood adversities and these negative health outcomes has also been detected in both children and adults (Atkinson et al., 2015; Bright, Knapp, Hinojosa, Alford, & Bonner, 2016; Dong et al., 2004). Notably, the impact of childhood adversities can pass onto the next generation (Galler & Rabinowitz, 2014; Pedersen, 2018). Epigenetic changes can be triggered by environmental factors including early life adversities, which alters gene expression and its impacts could last through the life span and even pass on to the next generations (Gudsnuk & Champagne, 2012; Kundakovic & Champagne, 2015). Research has shown an increased risk of PTSD, mood disorders, substance abuse, asthma, and excessive television watching among the offspring whose parent(s) were exposed to childhood adversities (Le-Scherban, Wang, Boyle-Steed, & Pachter, 2018; Yehuda, Bell, Bierer, & Schmeidler, 2008).

Specifically, considerable studies support the relationship between childhood adversities and mood disorders, including major depressive disorder (MDD), bipolar

disorder (BD) (type I – BDI and type II - BDII) (Angst, Gamma, Rossler, Ajdacic, & Klein, 2011; Li et al., 2016; Liu, 2017; Palmier-Claus, Berry, Bucci, Mansell, & Varese, 2016; Shanahan, Copeland, Costello, & Angold, 2011). It was found that childhood adversities, including child abuse and parental loss, were 2.63 times more likely to have occurred in patients with BD compared with non-clinical controls (Palmier-Claus et al., 2016). Meta-analyses of epidemiological and longitudinal studies also found a 2-3-fold increased odds of recurrent and chronic depression in adulthood (Li et al., 2016; Nanni, Uher, & Danese, 2012). Moreover, two longitudinal studies showed that childhood adverse experiences predicted more severe depressive symptoms and longer time to remission in adults (Fuller-Thomson, Battiston, Gadalla, & Brennenstuhl, 2014; Rhebergen et al., 2012). Furthermore, a study examining the relationship between childhood psychological abuse and depressive symptoms in adults showed that psychological abuse was positively related to automatic negative thoughts and negatively related to automatic positive thoughts, and these automatic thoughts both mediated the relationship between childhood maltreatment and symptoms of depression in adulthood (Gibb, Benas, Crossett, & Uhrlass, 2007).

Although childhood adversities are associated with many serious negative consequences, the good news is that early detection and intervention can prevent, or at least attenuate, the impact on the later-on health issues (Centre on the Developing Child, 2007; Pedersen, 2018). As a result, screening for exposure to child adversities is a critical step to identifying and preventing children at risk from developing later onset of psychiatric disorders. In addition, given that childhood adversities have long-

term and detrimental effects on mental health, it is also important for mental health professionals to detect early life adversities in their patients, which will help for secondary prevention of mental illnesses, such as remission and/or relapse of depression.

The Childhood Experience of Care and Abuse Questionnaire, version 3 (CECA.Q3) is one of the most widely used measurement tools for assessing the exposure to childhood adversities (see Appendix 1 for the full questionnaire). It is an extended version of the original CECA.Q which is a retrospective self-report assessment used to complete collect information on adverse events experienced before the age of 17 years. Due to its good psychometric properties, careful, detailed, and behaviorally based questioning, and wide range of experiences covered, CECA.Q is considered the gold standard for the assessment of childhood adversities (Schimmenti & Bifulco, 2015). This tool has been developed for over 20 years and is being used in clinical, forensic, and social work practice (CATS Middlesex University, 2019). It has been translated into numerous languages and is used in Europe, U.S., Canada, South America and Asia (CATS Middlesex University, 2019). CECA.Q3 examines relationships with parents and any abusive experiences in childhood and adolescence. These negative experiences include parental loss/separation, parental care (antipathy, neglect, and psychological abuse), role reversal, support, physical abuse, and sexual abuse (Bifulco, Bernazzani, Moran, & Jacobs, 2005). Research has demonstrated its reliability (Cronbach's α = 0.80-0.87) and validity (correlation coefficient r = 0.35-0.74, $p<0.01$) both in community and clinical samples (Bifulco et al., 2005; Fisher et

al., 2011; Li et al., 2006).

Why is a brief form of CECA.Q3 necessary?

The application of current CECA.Q3 is limited by a large number of items and length of time it takes to complete in clinical populations. According to a review study on measurement instruments of childhood adversities, CECA.Q required a relatively longer time (15-20 minutes) to complete and score compared with other instruments, such as Child Maltreatment Interview Schedule (CMIS, 5-10 minutes), Child Abuse and Trauma Scale (CATS, 5-10 minutes), and Child Trauma Questionnaire (CTQ, 10-15 minutes) (Burgermeister, 2007). This may affect participants' cooperation and adherence and may result in high missing data and loss of follow-up. Additionally, some items on childhood adversities measures of CECA.Q3 have been developed based on the investigators' clinical experience and sense (Bifulco, Brown, & Harris, 1994), rather than empirically data-driven methods, to yield specific childhood adversity dimensions or constructs.

Why is the brief form of CECA.Q3 more beneficial in a clinical setting?

First, the prevalence of childhood adversities in patients with mental disorders, especially mood disorders, is higher than that in the general population. Research has compared the prevalence of adverse childhood experiences among adults with mood disorders with the U.S. general population (Lu, Mueser, Rosenberg, & Jankowski, 2008). Approximately 89% of participants with mood disorders reported at least one adverse experience in childhood. In comparison, this rate was 64% and 74%, respectively, from two population surveys (Lu et al., 2008). A dramatically high

prevalence of child adversities (93%) was also recently found in Kenyan patients with substance use disorders (Kiburi, Molebatsi, Obondo, & Kuria, 2018).

Second, given the well-established relationship between childhood adversities and mood disorders, it is necessary to screen for the exposure to early life adversities for this clinical population to better understand their situation. A more practical instrument could shorten the length of the interview, improve patients' compliances, reduce the psychiatric and psychological burden from the recall of negative experiences, and assist in the investigation of underlying mechanisms between maltreatment and mood disorders.

This project is targeted at the above-mentioned issues in the measurement of childhood adversities. We aimed to: (1) develop and validate a brief form of CECA.Q3 (CECA.Q3-BF) in a clinical population with mood disorders to improve its application; and (2) determine optimal cut-off points of CECA.Q3-BF for participants with mood disorders.

Methods

Study sample

A total of 241 outpatients with a clinical diagnosis of mood disorder were recruited from the Mood Disorders Program (MDP) of a large, university-based teaching hospital in Montreal, Canada. The hospital provides services for the general population representing all socioeconomic levels and a wide range of ethnic groups. Only those, who were aged 18 years or more at the time of study screening and had a diagnosis of current or lifetime MDD and/or BDI or BDII) according to the

Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV) (Bell, 1994) and participated in the CECA.Q3 interview, were included in this study. Those who cannot understand or communicate either in English or French were excluded. All participants were clinically euthymic, therefore, not suffering from a current mood episode. A total number of 210 participants were included in this study (Table 1). The ethical approval was obtained from the Research Institute of the McGill University Health Centre (11-520-PSY), with informed consent completed by all participants.

Study procedure

Eligible subjects with a primary mood diagnosis of MDD, BDI or BDII were identified and informed about the study by a member of their treating team at the MDP, usually either a psychiatrist, psychiatry resident or nurse. In addition to having a primary mood disorder, subjects had to be currently euthymic (i.e. not actively experiencing a major depressive, manic, or hypomanic episode) and able to provide informed consent before being approached a member of the research team for recruitment. The subjects were then met by either a graduate student or trained research volunteer (e.g., medical school student) who would describe the purpose of the study and its procedures. Upon agreeing to participate and signing the consent form, subjects were given a package of questionnaires to take home and complete. They then underwent a single three-hour session which included a psychiatric diagnostic interview and a family history interview administered by a trained graduate student or research assistant. Following their participation, subjects were provided with twenty dollars compensation to cover their travel expenses. Accuracy about the

participants' psychiatric history, treatment, and the diagnosis was verified by a review of their medical charts and confirmation from their treating physician when necessary.

Measures

Clinical diagnoses of psychiatric diseases. The research version of the Structured Clinical Interview for the Diagnosis of DSM-IV Disorders (SCID) was used to assess participants' socio-demographic characteristics and to verify the diagnoses of MDD and BD. This structured interview was administered by trained masters-level graduate students who underwent a four-month SCID-training conducted by a SCID-certified trainer. The interviews took between 45 minutes and two hours to complete. In addition, we also collected information on a variety of mental disorders via SCID, including mood disorders (MDD, BD type I and type II, dysthymic disorder, and schizoaffective disorder), substance use disorders (alcohol abuse, alcohol dependence, substance abuse, and substance dependence), anxiety disorders (panic disorder, agoraphobia disorder, social phobia, specific phobia, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), and generalized anxiety disorder (GAD)), and eating disorders (anorexia, bulimia, and binge eating disorder).

Childhood adversities. Participants were invited to complete the CECA.Q3, which was used to measure various types of childhood adversities, including subscales *Parental loss*, *Parental care* (*Antipathy, Neglect, and Psychological abuse*), *Role reversal, Support, and Physical and Sexual abuse.*

Parental loss. Parental loss during childhood is assessed in the CECA.Q3

through two screening questions: (1) “Did either parent die before you were age 17”, and (2) “Have you ever been separated from your parent for one year or more before age 17”. These items offer binary options (1=Yes and 0=No for mother and father, respectively), and detailed questions are then asked subsequently for events, such as age, duration, and reason for separation. This section yields a score ranging from 0 to 4 with higher scores indicating more loss risk factors.

Antipathy. Parental antipathy refers to “hostile or cold parenting” and is assessed by eight statements like “She/He was very difficult to please” (Bifulco et al., 2005). These antipathy items are scored for mother and father, respectively, on a 5-point Likert scale ranging from 1 (No, not at all) to 5 (Yes, definitely) (Bifulco et al., 2005). This section yields a score ranging from 8 to 40, with higher scores indicating more maternal/paternal antipathy during childhood. Cut-off scores for adults with major depression are used to indicate ‘marked or moderate’ level of severity for antipathy: 28 points for mother, 30 for father (CATS Middlesex University, 2014).

Neglect. Neglect refers to parent's disinterest in material needs, health, schoolwork, and friendships, is evaluated by eight statements like “She/He was concerned about my worries” and “She/He neglected my basic needs (e.g. food and clothes)”. These neglect items are scored for mother and father, respectively, on a 5-point Likert scale ranging from 1 (No, not at all) to 5 (Yes, definitely) (Bifulco et al., 2005). This section yields a score ranging from 8 to 40, with higher scores indicating more maternal/paternal neglect during childhood. Cut-off scores for adults with major depression are used to indicate ‘marked or moderate’ level of severity for neglect: 25

points for mother, 26 for father (CATS Middlesex University, 2014).

Psychological abuse. There are 17 items for mother and father, respectively, to assess the amount and frequency of psychological abuse during childhood for statements like “She/He would tease me”. Each item is scored as 0 (No), 1 (Unsure), and 2 (Yes). This section yields a score ranging from 0 to 34 for mother and father, respectively, with higher scores indicating more maternal/paternal psychological abuse. The corresponding frequency for each item is scored for mother and father, respectively, from 0 (Never) to 3 (Often). Thus, it yields a total frequency score ranging from 0 to 51 for mother and father, respectively, with higher scores indicating more frequent maternal/paternal psychological abuse during childhood. The cut-off score for the ‘marked or moderate’ psychological abuse is not officially defined (CATS Middlesex University, 2014). In this study, the cut-off of the mean plus one standard deviation was used. This yielded a cut-off score of 12.6 and 12.3 for maternal and paternal psychological abuse, respectively,

Role reversal. The CECA.Q3 assesses the experience of role reversal or parentification during childhood, which refers to the degree to which a child has to take over the responsibilities of a parent at a very young age, or the degree to which a child was expected to provide emotional support by parents which is more appropriate from an adult (Brown, Craig, Harris, Handley & Harvey, 2007). A total of 17 questions, such as “Did you have a lot of responsibility in the home as a child, more than other children your age?” are used in this subscale and scored on a 5-point Likert scale ranging from 1 (No, not at all) to 5 (Yes, definitely). The total role reversal

scores could range from 17 to 85, with higher scores indicating more role reversal during childhood. Similarly, we used the mean plus one standard deviation of the total score to indicate the severity of role reversal. This yielded a cut-off score of 54.0.

Support. Close relationships in childhood are assessed in the CECA.Q3 through three screening questions regarding supportive adult, supportive peer, and closest people. These items offer binary options (1=Yes, 0=No), and questions on the relationship are then asked subsequently. Total support scores could range from 0 to 3, with higher scores indicating better support during childhood.

Physical abuse. Physical abuse during childhood is screened by a single question "When you were a child or teenager were you ever hit repeatedly with an implement (such as a belt or stick) or punched, kicked or burnt by someone in the household" (1=Yes, 0=No). A series of severity questions are then followed to collect information about the abusive experience from mother and father, respectively. These questions are: (1) "Did the hitting happen on more than one occasion?" (yes=1, no=0), (2) "How were you hit?" (belt or stick or punched=1, kicked=1, hit with hand=0, other=0), (3) "Were you ever injured, e.g. bruises, black eyes, broken limbs?" (yes=1, no=0), and (4) "Was this person so angry they seemed out of control?" (yes=1, no=0). The severity of physical abuse for each parent could range from 0-4, with higher scores indicating more severe physical abuse from that parent during childhood. The cut-off score for 'marked' physical abuse is a score of at least 1 for one or both parent(s) (Bifulco et al., 2005).

Sexual abuse. Three screening questions are used to screen sexual abuse during

childhood. One example of these three questions is “When you were a child or teenager, did you ever have any unwanted sexual experiences” which is scored as 0 (No), 1 (Unsure), and 2 (Yes). The total score could range from 0 to 3, with higher scores indicating more sexual abuse during childhood. Seven subsequent questions are then followed to evaluate the severity of sexual abuse, such as “Was the other person someone you knew” (1=Yes, 0=No). The severity of sexual abuse yielded scores ranging from 0 to 7, with higher scores indicating more severe sexual abuse. The cut-off for ‘marked or moderate’ sexual abuse is at least one “yes” answer for these three screening questions (Bifulco et al., 2005).

Statistical analyses

The total analytic sample of 210 subjects was randomly split into two groups: a training group and a testing group for cross-validation purposes (Arlot & Celisse, 2010). The training group was used for item deduction, whereas the testing group was used to verify the reliability and classification of the shortened questionnaire compared with the full version.

For the subscales of CECA.Q3 with Likert scale or ordinal format (*Antipathy*, *Neglect, Psychological abuse*, and *Role reversal*), principal component analyses were applied because the primary purpose was to identify and compute composite scores for the factors underlying the short version of the CECA.Q3. Principal component analysis has been commonly used to “test whether an existing measurement scale (e.g., a questionnaire) can be shortened to include fewer items (e.g., questions/statements)” (Laerd Statistics, 2018), and has been applied in many studies

on the development of shortened questionnaires (Barke, Bleichhardt, Rief, & Doering, 2016; Foerster, Roser, Schoeni, & Roosli, 2015; Goodwin, Lambrinos, Ferro, Sabaz, & Speechley, 2015; Wang et al., 2018). For those subscales with binary answers (*Parental loss, Support, Physical abuse*, and *Sexual abuse*), categorical principal component analyses were used (Linting, Meulman, Groenen, & van der Koojj, 2007).

Prior to the factor analysis, Bartlett's test of sphericity (Snedecor & Cochran, 1989) was conducted to ensure sufficient correlations exist among the items to proceed ($P<0.05$). Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (>0.60) (Kaiser & Rice, 1974) was also examined. Principal component analysis with varimax rotation was used to remove potentially redundant items for each studied subscale. Given the missing values in the dataset, maximum likelihood with the expectation-maximization (EM) algorithm was used to estimate the covariance matrix (Graham, 2009; Truxillo, 2005; Weaver & Maxwell, 2014). The number of factors was determined by the Scree test with the eigenvalues greater than 1. Items with lower than cut-off score of factor loading were then removed. The cut-off score of factor loading was defined according to sample size (Hair, Black, Babin, & Anderson, 2014). Since different sample sizes will offer different power to the analysis, Hair et al. believed that when it comes to determining the cut-off score of factor loadings, the sample size should also be taken into account. The cut-off score of factor loading should be smaller when the sample size is large; conversely, the cut-off score could be larger when the sample size is small (Hair et al., 2014). In this analysis, the cut-off score of factor loading was varied by subscale. The Cronbach's alpha was checked

before and after to see if the exclusion of the items significantly decreased the reliability. Items significantly associated with the changes of the Cronbach's alpha were retained in the subsequent analyses. All these above analyses were done with the training dataset and by subscales.

In the testing dataset, cross-validation was conducted to examine whether the CECA.Q3-BF could have a good yield of accuracy. Cronbach's alpha was used to examine the reliability of CECA.Q3-BF. Sensitivity, specificity, and area under the receiver operating characteristic curve (AUC) were generated by comparing the test results from the full version (as the gold standard) with the brief version of CECA.Q3. New cut-off points for each subscale were also determined by maximizing the combination of sensitivity, specificity, and correct classification. All the analyses were conducted using Stata, Version 14 (StataCorp., 2015).

Results

Table 1 showed the socio-demographic characteristics of the study sample. The study cohort (N=210) included more females (61.4%) than males (38.6%). Most of the participants were never married (41.0%), living alone (39.0%), having no child (54.3%), and with a high level of education (graduate school, 53.9%) and occupation (Administrative/executive/professional, 41.6%). The study sample was randomly split into training (n=103) and testing groups (n=107). There was no significant difference between these two groups in terms of subjects' socio-demographic characteristics (e.g. age, sex, education, marital status, living arrangement, number of kids, and occupation) and prevalence of psychiatric diagnoses (P>0.05).

Subscales *Parental loss, Support, Physical abuse,* and *Sexual abuse*

For the subscales with dichotomous answers (*Parental loss, Support, Physical abuse,* and *Sexual abuse*), no items were removed from the analyses. The statistical results are available upon request.

Subscales *Antipathy*, *Neglect*, *Psychological abuse*, and *Role reversal*

All the four subscales had items reduction without compromising their accuracy of measurements for childhood adversities. They were *Antipathy* (mother – removed 2 items, father – 2 items), *Neglect* (mother – 3 items, father – 2 items), *Psychological abuse* (mother – 6 items, father – 9 items), and *Role reversal* (11 items). A summary of studied scales for their remaining and removing items is shown in Appendix 2. Detailed statistics for factor analysis of the remaining items, including factor loadings, uniquenesses, and communalities, are shown in Appendix 3. Reliability and accuracy indicators, including Cronbach's alpha, AUC, sensitivity, and specificity, and new cut-off points for 'market or moderate' severity in the CECA.Q3-BF are presented in Table 2. To illustrate the process of principal component analysis in each subscale, we present the details as following:

Antipathy mother. Initially, the factorability of the eight antipathy mother items was examined. Due to the missing values in the data, several well-recognized criteria for the factorability of covariance, instead of correlation, were used. Firstly, it was observed that all the 8 items had at least 0.7 of covariance with at least one other item, suggesting reasonable factorability. Secondly, the maximum likelihood with the expectation-maximization (EM) algorithm was also used to estimate the covariance

matrix. The EM covariances were also all over 0.7 (see Appendix 4). Thirdly, the Kaiser-Meyer-Olkin (KMO) was 0.85, indicating that the data are meritorious for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (28) =429.80, $p < 0.05$). Finally, the communalities were at least around 0.5, further confirming that each item shared some common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable for all eight items.

The principal component analysis initially generated four factors, which explained 54.7%, 24.8%, 16.8%, and 3.8% of the variance respectively. Using an eigenvalue greater than 1, the scree test yielded a 1-factor solution with eigenvalues of 4.4 accounting for 54.7% of the total variance. Varimax rotation was performed, and based on the sample size, a cut-off score of 0.60 for rotated factor loading was used to determine if an item would be retained or removed for CECA.Q3-BF. Two items were eliminated because they did not contribute to a simple factor structure and failed to meet the minimum criteria of factor loading. Thus, the brief form subscale retains 6 items and could score from 6 to 30, with higher scores indicating more maternal antipathy during childhood.

Detailed statistics for individual items, including number of observations, mean, standard deviation, cut-off score for factor loading, rotated factor loading, uniqueness, and communality are reported in Table 4.

Antipathy father. The factorability of the eight antipathy father items was initially examined. Firstly, it was observed that all the 8 items had at least 1.7 of

covariance with at least one other item, suggesting reasonable factorability. Secondly, the EM covariances were also all over 1.1 with at least one other item. Thirdly, the KMO was 0.85, indicating that the data are meritorious for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (28) =318.82, $p <$ 0.05). Finally, the communalities were all above 0.4, further confirming that each item shared some common variance with other items. Factor analysis was deemed to be suitable for all eight items.

The principal component analysis initially generated four factors, which explained 48.9%, 21.0%, 16.2%, and 13.9% of the variance respectively. The scree test yielded a 3-factor solution with eigenvalues of 2.2, 1.6, and 1.3 respectively, accounting for 86.1% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.60. Three items failed to meet the minimum criteria of the factor loading, but one of which significantly affected reliability and thus was retained in the scale. Therefore, two items were eliminated, and the brief form subscale retains 6 items with total score ranged from 6 to 30, with higher scores indicating more paternal antipathy during childhood.

Neglect mother. The factorability of the eight neglect mother items was initially examined. Firstly, all the eight items had at least 1.1 of covariance with at least one other item, suggesting reasonable factorability. Secondly, the EM covariances were also all over 0.4 with at least one other item. Thirdly, the KMO measure was 0.74, indicating that the data are middling for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (28) =250.04, $p < 0.05$). Finally, the

communalities were all above 0.3, further confirming that each item shared some common variance with other items. Factor analysis was deemed to be suitable for all the items.

The principal component analysis initially generated four factors, which explained 53.3%, 13.3%, 27.1%, and 6.3% of the variance respectively. The scree test yielded a 2-factor solution with eigenvalues of 2.1 and 1.6 respectively, accounting for 81.4% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.55. Three items failed to meet the minimum criteria of factor loading and thus were eliminated. The brief form subscale retained 5 items and could score from 5 to 25, with higher scores indicating more maternal neglect during childhood.

Neglect father. The factorability of the eight neglect father items was initially examined. Firstly, all the eight items had at least nearly 1.0 of covariance with at least one other item, suggesting reasonable factorability. Secondly, the EM covariances were also at least nearly 1.0 with at least one other item. Thirdly, the KMO measure was 0.86, indicating the data are meritorious for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (28) =454.25, $p < 0.05$). Finally, the communalities were all above 0.4, further confirming that each item shared some common variance with other items. Factor analysis was deemed to be suitable for all the items.

The principal component analysis initially generated four factors, which explained 56.6%, 27.2%, 8.5%, and 7.8% of the variance respectively. The scree test

yielded a 1-factor solution with eigenvalues of 4.1, accounting for 56.6% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.54. Two items failed to meet the minimum criteria of factor loading and thus were eliminated. The brief form subscale retained 6 items and could score from 6 to 30, with higher scores indicating more paternal neglect during childhood.

Psychological abuse mother. The factorability of the 17 psychological abuse mother items was initially examined. Firstly, most items had at least 0.2 of covariance with at least one other item, suggesting some factorability. Secondly, most EM covariances were also at least nearly 0.2 with at least one other item. Thirdly, the KMO measure was 0.78, indicating that the data are middling for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (136) =910.38, $p < 0.05$). Finally, the communalities were at least nearly 0.4, indicating that each item shared some common variance with other items. Factor analysis was deemed to be suitable for this subscale.

The principal component analysis initially generated 11 factors. The first factor explained 46.4% of the variance. The rest factors explained only 1.8% to 8.8% of the variance. The scree test yielded a 4-factor solution with eigenvalues of 5.6, 1.1, 1.5, and 1.1 accounting for 69.8% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.60. Six items failed to meet the minimum criteria of factor loading and thus were eliminated. The brief form subscale retained 11 items and could score from 0 to 22, with higher scores indicating more maternal psychological abuse during childhood.

Psychological abuse father. The factorability of the 17 psychological abuse father items was examined. Firstly, most items had at least 0.2 of covariance with at least one other item, suggesting some factorability. Secondly, most EM covariances were over 0.5 with at least one other item. Thirdly, the KMO was 0.85, indicating that the data are meritorious for factor analysis (Kaiser & Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (136) =854.90, $p < 0.05$). Finally, the communalities were at least nearly 0.4, confirming that each item shared some common variance with other items. Factor analysis was deemed to be suitable for the subscale.

The principal component analysis initially generated 11 factors. The first five factors explained 17.6%, 21.6%, 18.7%, 10.2%, and 8.6% of the variance. The rest factors explained only 2.1% to 5.6% of the variance. The scree test yielded a 2-factor solution with eigenvalues of 6.0 and 2.1 accounting for 40.3% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.60. Nine items failed to meet the minimum criteria of factor loading and were eliminated. The brief form subscale retained 8 items and could score from 0 to 16, with higher scores indicating more paternal psychological abuse during childhood.

Role reversal. One out of 20 items in this subscale was removed from analysis due to high percentage of missing data (55.3%, 57/103). The factorability of the 19 psychological abuse father items was examined. Firstly, most items had at least 1.2 of covariance with at least one other item, suggesting reasonable factorability. Secondly, most EM covariances were over 1.0 with at least one other item. Thirdly, the KMO measure was 0.72, indicating that the data are middling for factor analysis (Kaiser &

Rice, 1974), and Bartlett's test of sphericity was significant (χ^2 (171) =552.01, $p <$ 0.05). Finally, the communalities were all over 0.3, confirming that each item shared some common variance with other items. Factor analysis was deemed to be suitable for the subscale.

The principal component analysis initially generated 13 factors. The first six factors explained 12.4%, 20.0%, 12.5%, 9.5%, 10.7%, and 8.1% of the variance. The rest factors explained only 2.0% to 6.1% of the variance. The scree test yielded a 2-factor solution with eigenvalues of 4.4 and 2.4 accounting for 32.5% of the total variance. Varimax rotation was performed, and a cut-off score for rotated factor loading was 0.60. Thirteen items failed to meet the minimum criteria of factor loading. However, two of them were kept in the CECA.Q3-BF because of their significant impacts on reliability. Thus, the brief form subscale retained 9 items and could score from 9 to 45, with higher scores indicating more role reversal during childhood.

Discussion

In this study, we developed and validated a brief form of CECA.Q3 (CECA.Q3-BF) in a clinical sample of patients with mood disorders. Overall, the CECA.Q3-BF removed 35.0% items (35/100 items) from the CECA.Q3. For subscales *Antipathy, Neglect, Psychological abuse*, and *Role reversal,* it had no substantial deduction of reliability due to the reduction of items compared to the full version. In some subscales (e.g. *Neglect mother, Neglect father,* and *Psychological abuse father*), the CECA.Q3-BF yielded even better reliability than the full version. The cross-

validation by subscales in the testing dataset showed acceptable internal reliability and accuracy of CECA.Q3-BF. The AUCs for each subscale were all above 0.90, along with very satisfactory sensitivities and specificities. The CECA.Q3-BF yields equally or even more reliable and accurate indices for childhood adversities measurement in this clinical population with improved feasibility, which means a shorter questionnaire period, better participants' cooperation and adherence, and avoiding potential issues related to long self-reporting period, such as missing data and loss of follow-up.

From the analyses, there were no items removed from the subscales with binary answers – *Parental loss, Support, Physical abuse,* and *Sexual abuse*. One possible reason is that there are only a few screening questions in such subscales as *Parental loss* (2 items), *Support* (3 items), and *Sexual abuse* (3 items). It is not easy to reduce the dimension when it is already small. Another potential reason is that for *Physical abuse* and *Sexual abuse*, the questions for the severity of abusive experiences are following a progressive logic. Only those participants answered "yes" in the screening questions will have the chance to answer the severity questions. Therefore, the available sample size for these severity questions is too small to detect positive findings.

This study developed and validated a brief form of CECA.Q3 (CECA.Q3-BF), which significantly reduced the questionnaire time while maintaining the accuracy of the scale. CECA.Q3 has several advantages in terms of having satisfactory reliability and validity as a self-report measure for adverse childhood experience, in particular

focusing on parental care and abuse and meriting the application for both research and clinical work (Bifulco et al., 2005). Compared to the original CECA.Q3, the CECA.Q3-BF is a more practical assessment tool requiring less time and effort from depressed or hypomanic patients whose attention and concentration are usually compromised. It also saves time for interviewers and makes interviews more cost-effective, which will be beneficial for both clinical and research settings. The brief version not only uses less time to understand what ACEs patients have had but also helps diagnoses and projects prognosis of the diseases. Additionally, the brief form was developed and validated in a clinical sample with mood disorders. Based on the wide-accepted association between childhood adversities and mental health issues, this population is more prone to be exposed to and more sensitive to early life adversities compared with the general population. A practical screening instrument with high sensitivity and specificity increases the recognition of childhood adversities and in turn, prevents secondary developments of mental disorders. It will also facilitate further exploration of the underlying mechanisms between childhood adversities and mood disorders. Finally, data-driven methods were used for the dimension deduction, which addresses the gap that the original tool was generated based on investigators' clinical experience alone. As McLennan, MacMillan & Afifi (2020) suggested that issues, including limited item coverage, collapsing of items and response options, a simplistic scoring approach, and the lack of psychometric assessment, should be addressed in the questionnaires of measuring ACEs. Our study focused on the dimension deduction of existing items and the improvement of

CECA.Q3's feasibility, the strengths of CECA.Q3 remained in this brief version. In other words, CECA.Q3-BF has satisfactory reliability and validity as a self-report measure for adverse childhood experience focusing on parental care and abuse.

We noticed some item discrepancies in the subscales when maternal and paternal adversities are evaluated separately, indicating that mother and father play different roles and emphasize different aspects in the children's development, especially in early childhood. For example, in the CECA.Q3-BF, the retained items in Antipathy and Neglect for mother and father are similar, while the items in Psychological abuse for father are much less and quite different from those for mother. Mothers may play a more critical role in psychological interactivities with children compared with fathers. Sex differences in the study sample may be another reason. Since there were more female participants in the study, they may have a closer relationship with their mother when they were young.

However, there are several limitations to be noted. Firstly, since this analysis was conducted in a clinical sample, the CECA.Q3-BF and the new cut-offs are only applicable to the clinical population with mental disorders. The results of dimension reduction analysis and thresholds for diagnosis may vary for the general population. Secondly, the sample size of this study was not large, which may affect the data analyses to detect correlations among items and reduce dimensions. The small sample size also limited the application of factor analyses to all the items in CECA.Q3 simultaneously. Thus, the interpretation of the results should be cautious because the results were generated from analyses by subscale. Thirdly, since this study was

conducted in one single clinical setting in Montreal, Canada, the reliability and validity of the CECA.Q3-BF need to be further tested, including test-retest reliability, content validity, construct validity, across a variety of clinical settings with different prevalence of mood disorders and in a different socio-cultural context. Additionally, categorical principal component analyses failed to detect redundant items in the subscale *Parental loss, Support, Physical abuse*, and *Sexual abuse* due to the potential reasons mentioned above. Also, open-ended questions, such as "please describe your experience", were not able to be dealt with by quantitative methods. Focus group discussions with key informants can be held in the future to shorten those categorical subscales and detailed follow-up questions. Furthermore, McLennan and colleagues (2020) pointed out issues like lack of item coverage, such as lack of coverage on peer victimization, exposure to community violence, low socio-economic status, poverty, and parent mental illness, and simple scoring system that assumes the weight of each item treated equally on the influence of outcomes are important to study adverse childhood experiences. Because these issues were not covered in the CECA.Q3 and this study focused on the dimension deduction of existing items and the improvement of CECA.Q3's feasibility, therefore we cannot address these issues. Finally, like the CECA.Q3 and all other retrospective measurement tools for childhood adversities, information collected using CECA.Q3-BF is prone to false memory and information bias. It is reported that retrospective reports are likely to underestimate the incidence of abuse/neglect (Hardt, & Rutter, 2004). Conclusions drawn from the retrospective recall of childhood adversities should be interpreted with caution.

Conclusion

Overall, the CECA.Q3-BF offers a briefer but good accuracy of measurements for childhood adversities particularly focusing on parental care and abuse. Although the accuracy of this brief form needs to be replicated by other studies, it could facilitate the application of CECA.Q3-BF in the clinical settings, as it significantly reduces the length of the interview and therefore has better compliances from respondents. Future research on ACEs could use the CECA.Q3-BF as a start point to study childhood experiences on parental care and abuse and expand the item coverage of ACEs, such as peer victimization, exposure to community violence, low socio-economic status, poverty, and parent mental illness, as needed.

References

Afifi, T. O. (2012). The relationship between child maltreatment and axis I mental disorders: a summary of the published literature from 2006 to 2010. *Open Journal of Psychiatry, 2*, 21-32.

Afifi, T. O., Mather, A., Boman, J., Fleisher, W., Enns, M. W., Macmillan, H., & Sareen, J. (2011). Childhood adversity and personality disorders: results from a nationally representative population-based study. *Journal of Psychiatric Research, 45*(6), 814-822.

Angst, J., Gamma, A., Rossler, W., Ajdacic, V., & Klein, D. N. (2011). Childhood adversity and chronicity of mood disorders. *Eur Arch Psychiatry Clin Neurosci, 261*, 21-27.

Arlot, S., & Celisse, A. (2010). A survey of cross-validation procedures for model selection. *Statistics Surveys, 4*(0), 40-79. doi:10.1214/09-ss054

Atkinson, L., Beitchman, J., Gonzalez, A., Young, A., Wilson, B., Escobar, M., . . . Villani, V. (2015). Cumulative risk, cumulative outcome: a 20-year longitudinal study. *Plos ONE, 10*(6), e0127650.

Barke, A., Bleichhardt, G., Rief, W., & Doering, B. K. (2016). The Cyberchondria Severity Scale (CSS): German Validation and Development of a Short Form. *International Journal of Behavioral Medicine, 23*(5), 595-605.

Bell, C. C. (1994). Dsm-iv: Diagnostic and statistical manual of mental disorders. *JAMA, 272*(10), 828-829. doi:10.1001/jama.1994.03520100096046

Bifulco, A., Bernazzani, O., Moran, P. M., & Jacobs, C. (2005). The childhood experience of care and abuse questionnaire (CECA.Q): validation in a community series. *The British Journal of Clinical Psychology, 44*(0144-6657 (Print)), 563-581. doi:10.1348/014466505X35344

Bifulco, A., Brown, G. W., & Harris, T. O. (1994). Childhood Experience of Care and Abuse (CECA): a retrospective interview measure. *J. Child Psychol. Psychiat., 35*, 1419-1435.

Braga, T., Gonçalves, L. C., Basto-Pereira, M., & Maia, Â. (2017). Unraveling the link between maltreatment and juvenile antisocial behavior: A meta-analysis of prospective longitudinal studies. *Aggression and Violent Behavior, 33*, 37-50. doi:https://doi.org/10.1016/j.avb.2017.01.006

Bright, M. A., Knapp, C., Hinojosa, M. S., Alford, S., & Bonner, B. (2016). The comorbidity of physical, mental, and developmental conditions associated with childhood adversity: a population-based study. *Maternal and Child Health Journal, 20*(4), 843-853.

Brown, G. W., Craig, T. K., Harris, T. O., Handley, R. V., & Harvey, A. L. (2007). Development of a retrospective interview measure of parental maltreatment using the Childhood Experience of Care and Abuse (CECA) instrument -- A life-course study of adult chronic depression - 1. *Journal of Affective Disorders, 103*(1-3), 205-215.

Burgermeister, D. (2007). Childhood adversity: a review of measurement instruments.

Journal of Nursing Measurement, 15(3), 163-176.

CATS Middlesex University. (2014). CECA.Q scoring. Retrieved from https://lifespantraining.org.uk/wp-content/uploads/CECA.Q-scoring.pdf

CATS Middlesex University. (2019). Childhood Experience of Care and Abuse (CECA) Interview - introduction and background. Retrieved from https://lifespantraining.org.uk/types-of-training/childhood-experience-of-care-abuse-ceca/ceca-introduction-and-background/

Champbell, J. A., Walker, R. J., & Egede, L. E. (2016). Associations between adverse childhood experiences, high-risk behaviors, and morbidity in adulthood. *American Journal of Preventive Medicine, 50*, 344-352.

Centre on the Developing Child. (2007). The impact of early adversity on child development (in brief). Retrieved from www.developingchild.harvard.edu

Dong, M., Giles, W. H., Felitti, V. J., Dube, S. R., Williams, J. E., Chapman, D. P., & Anda, R. F. (2004). Insights into causal pathways for ischemic heart disease: adverse childhood experiences study. *Circulation, 110*(13), 1761-1766.

Fisher, H. L., Craig, T. K., Fearon, P., Morgan, K., Dazzan, P., Lappin, J., . . . Morgan, C. (2011). Reliability and Comparability of Psychosis Patients' Retrospective Reports of Childhood Abuse. *Schizophrenia Bulletin, 37*(3), 546-553. doi:10.1093/schbul/sbp103

Foerster, M., Roser, K., Schoeni, A., & Roosli, M. (2015). Problematic mobile phone use in adolescents: derivation of a short scale MPPUS-10. *International Journal of Public Health, 60*(2), 277-286.

Fox, S. E., Levitt, P., & Nelson, C. A. r. (2010). How the timing and quality of early experiences influence the development of brain architecture. *Child Dev., 81*(1), 28-40.

Fuller-Thomson, E., Battiston, M., Gadalla, T. M., & Brennenstuhl, S. (2014). Bouncing back: remission from depression in a 12-year panel study of a representative Canadian community sample. *Social psychiatry and psychiatric epidemiology, 49*(6), 903-910.

Galler, J., & Rabinowitz, D. G. (2014). Chapter seven - the intergenerational effects of early adversity. *Progress in Molecular Biology and Translational Science, 128*, 177-198.

Gibb, B. E., Benas, J. S., Crossett, S. E., & Uhrlass, D. J. (2007). Emotional maltreatment and verbal victimization in childhood: relation to adults' depressive cognitions and symptoms. *Journal of Emotional Abuse, 7*(2), 59-73.

Goodwin, S. W., Lambrinos, A. I., Ferro, M. A., Sabaz, M., & Speechley, K. N. (2015). Development and assessment of a shortened Quality of Life in Childhood Epilepsy Questionnaire (QOLCE-55). *Epilepsia, 56*(6), 864-872. doi:10.1111/epi.13000

Graham, J. W. (2009). Missing data analysis: making it work in the real world. *Annu Rev Psychol, 60*, 549-576. doi:10.1146/annurev.psych.58.110405.085530

Green, J. G., McLaughlin, K. A., Berglund, P. A., Gruber, M. J., Sampson, N. A.,

Zaslavsky, A. M., & Kessler, R. C. (2010). Childhood adversities and adult psychiatric disorders in the national comorbidity survey replication I: associations with the first onset of DSM-IV disorders. *Arch Gen Psychiatry, 67*(2), 113-123.

Gudsnuk, K., & Champagne, F. A. (2012). Epigenetic influences of stress and the social environment. *ILAR J., 53*(3-4), 279-288.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). *Multivariate data analysis* (7th ed.). London, UK: Pearson Education Limited.

Hardt, J., & Rutter, M. (2004). Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *Journal of Child Psychology and Psychiatry, 45,* 260-273.

Kachaeva, M. A., Sethi, D., Badmaeva, V. D., Novozhilov, A. V., & Ivanov, A. V. (2014). *Survey on the prevalence of adverse childhood experiences among young people in the Russian Federation*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0010/267283/Survey-on-the-prevalence-of-adverse-childhood-experiences-among-young-people-in-the-Russian-Federation-Eng.pdf?ua=1

Kaiser, H. F., & Rice, J. (1974). Little jiffy, Mark IV. *Educational and Psychological Measurement, 34*, 117.

Kessler, R. C., Davis, C. G., & Kendler, K. S. (1997). Childhood adversity and adult psychiatric disorder in the US National Comorbidity Survey. *Psychological Medicine, 27*(5), 1101-1119.

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., . . . Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *Br J Psychiatry, 197*(5), 378-385.

Kiburi, S. K., Molebatsi, K., Obondo, A., & Kuria, M. W. (2018). Adverse childhood experiences among patients with substance use disorders at a referral psychiatric hospital in Kenya. *BMC Psychiatry, 18*, 197. doi:10.1186/s12888-018-1780-1

Kundakovic, M., & Champagne, F. A. (2015). Early-life experience, epigenetics, and the developing brain. *Neuropsychopharmacology, 40*, 141-153.

Laerd Statistics, L. (2018). Principal Components Analysis (PCA) using SPSS statistics. Retrieved from https://statistics.laerd.com/spss-tutorials/principal-components-analysis-pca-using-spss-statistics.php

Le-Scherban, F., Wang, X., Boyle-Steed, K. H., & Pachter, L. M. (2018). Intergenerational associations of parent adverse childhood experiences and child health outcomes. *Pediatrics, 141*(6). doi:10.1542/peds.2017-4274

Li, H., Zhang, Y., Wu, J., Zhou, Y., Li, L., & Zhao, X. (2006). Reliability and validity of Childhood Experience of Care and Abuse Questionnaire in the community population. *Chinese Journal of Tissue Engineering Research, 10*(26), 168-170.

Li, M., D'Arcy, C., & Meng, X. (2016). Maltreatment in childhood substantially increases the risk of adult depression and anxiety in prospective cohort

studies: a systematic review, meta-analysis, and population attributable fractions. *Psychological Medicine, 46*(4), 717-730.

Linting, M., Meulman, J. J., Groenen, P. J., & van der Koojj, A. J. (2007). Nonlinear principal components analysis: introduction and application. *Psychol Methods, 12*(3), 336-358. doi:10.1037/1082-989X.12.3.336

Liu, R. T. (2017). Childhood Adversities and Depression in Adulthood: Current Findings and Future Directions. *Clinical psychology: a publication of the Division of Clinical Psychology of the American Psychological Association, 24*(2), 140-153. doi:10.1111/cpsp.12190

Lu, W., Mueser, K. T., Rosenberg, S. D., & Jankowski, M. K. (2008). Correlates of adverse childhood experiences among adults with severe mood disorders. *Psychiatric Services, 59*(9), 1018-1026.

McGrath, J. J., McLaughlin, K. A., Saha, S., Aguilar-Gaxiola, S., Al-Hamzawi, A., Alonso, J., . . . Kessler, R. C. (2017). The association between childhood adversities and the subsequent first onset of psychotic experiences: a cross-national analysis of 23998 respondents from 17 countries. *Psychological Medicine, 47*(7), 1230-1245.

McLaughlin, K. A. (2016). Future directions in childhood adversity and youth psychopathology. *J Chin Child Adolesc Psychol., 45*(3), 361-382.

McLaughlin, K. A., Conron, K. J., Koenen, K. C., & Gilman, S. E. (2010). Childhood adversity, adult stressful life events, and risk of past-year psychiatric disorder: a test of the stress sensitization hypothesis in a population-based sample of adults. *Psychological Medicine, 40*(10), 1647-1658.

McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2012). Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Arch Gen Psychiatry, 69*(11), 1151-1160.

McLennan, J. D., MacMillan, H. L., & Afifi, T. O. (2020). Questioning the use of adverse childhood experiences (ACEs) questionnaires. *Child Abuse & Neglect, 101*, 104331.

Nanni, V., Uher, R., & Danese, A. (2012). Childhood maltreatment predicts unfavorable course of illness and treatment outcome in depression: a meta-analysis. *Am J Psychiatry, 169*, 141-151.

Palmier-Claus, J. E., Berry, K., Bucci, S., Mansell, W., & Varese, F. (2016). Relationship between childhood adversity and bipolar affective disorder: systematic review and meta-analysis. *British Journal of Psychiatry, 209*(6), 454-459. doi:10.1192/bjp.bp.115.179655

Pedersen, T. (2018). Childhood adversity affects several generations. Retrieved from https://psychcentral.com/news/2013/05/06/childhood-adversity-affects-several-generations/54530.html

Rhebergen, D., Lamers, F., Spijker, J., De Graaf, R., Beekman, A., & Penninx, B. (2012). Course trajectories of unipolar depressive disorders identified by latent class growth analysis. *Psychological Medicine, 42*(7), 1383-1396.

Schimmenti, A., & Bifulco, A. (2015). Toward a better understanding of the relationship between childhood trauma and psychiatric disorders: measurement and impact on addictive behaviors. *Psychiatry Investigation, 12*(3), 415-416.

Shanahan, L., Copeland, W. E., Costello, E. J., & Angold, A. (2011). Child-, adolescent- and young adult-onset depressions: differential risk factors in development? *Psychol Med, 41*, 2265-2274.

Snedecor, G. W., & Cochran, W. G. (1989). *Statistical Methods* (Eighth ed.): Iowa State University Press.

StataCorp. (2015). *Stata Statistical Software: Release 14.* In.

Truxillo, C. (2005). *Maximum Likelihood Parameter Estimation with Incomplete Data*. Paper presented at the Proceedings of the Thirtieth Annual SAS(r) Users Group International Conference. http://www2.sas.com/proceedings/sugi30/111-30.pdf

Wang, Y. Y., Feng, Y., Xu, D. D., Huang, W., Chow, I. H. I., Ng, C. H., . . . Xiang, Y. T. (2018). The development and validation of a short version of the 33-item Hypomania Checklist (HCL-33). *J Affect Disord, 235*, 206-210. doi:10.1016/j.jad.2018.04.019

Weaver, B., & Maxwell, H. (2014). Exploratory factor analysis and reliability analysis with missing data: a simple method for SPSS users. *The Quantitative Methods for Psychology, 10*(2), 143-152.

Yehuda, R., Bell, A., Bierer, L. M., & Schmeidler, J. (2008). Maternal, not paternal, PTSD is related to increased risk for PTSD in offspring of Holocaust survivors. *Journal of Psychiatric Research, 42*(13), 1104-1111

Table 1. Characteristics of study population

	Range	Mean ± S.D.
Age	18-72	45.90 ± 14.25
Number of comorbid mental disorders	0-9	1.78 ± 2.03
	n	%
Sex		
Male	81	38.6%
Female	129	61.4%
Total	210	100.0%
Marital status		
Married	73	34.8%
Widowed/divorced/separated	51	24.3%
Never married	86	41.0%
Total	210	100.0%
Lives with		
Alone	78	39.0%
With partner and children	27	13.5%
With partner only	46	23.0%
With children only/parents/other relatives	25	12.5%
Other	24	12.0%
Total	200	100.0%
Number of children		
0	114	54.3%
1	31	14.8%
2	44	21.0%
3	13	6.2%
4	7	3.3%
5	1	0.5%
Total	210	100.0%
Highest level of education		
Part/completed high school	29	13.9%
Part college	33	15.9%
Completed 2-year college	34	16.3%
Completed 4-year/part graduate school	79	38.0%
Completed graduate school	33	15.9%
Total	208	100.0%
Occupation		
Administrative/executive/professional	87	41.6%
Technical/clerical/skilled labor	40	19.1%
Unskilled labor/homemaker	61	29.2%
Student	21	10.0%
Total	209	100.0%
Mood disorders		

	Major depressive disorder	74	35.4%
	Bipolar disorder I	69	33.0%
	Bipolar disorder II	66	31.6%
	Total	209	100.0%
Anxiety disorders			
	No	116	55.2%
	Yes	94	44.8%
	Total	210	100.0%
Eating disorders			
	No	178	84.8%
	Yes	32	15.2%
	Total	210	100.0%
Substance abuse			
	No	145	69.0%
	Yes	65	31.0%
	Total	210	100.0%

Table 2. Statistics for CECA.Q3-BF by subscale

		Training group				Testing group			
		Removed/ total items	α before removal	α after removal	New cut-off	α	AUC	Sensitivity	Specificity
Antipathy									
	Mother	2/8	0.90	0.89	>= 21	0.8820	0.94	94.12%	94.74%
	Father	2/8	0.87	0.84	>= 23	0.8023	1.00	100.00%	100.00%
Neglect									
	Mother	3/8	0.76	0.80	>= 17	0.7906	0.98	100.00%	95.88%
	Father	2/8	0.88	0.91	>= 24	0.8805	0.94	88.24%	100.00%
Psychological abuse									
	Mother	6/17	0.90	0.88	>= 10	0.8612	0.99	100.00%	98.70%
	Father	9/17	0.91	0.93	>= 9	0.8961	0.92	90.91%	93.59%
Role reversal		11/20	0.84	0.80	>= 28	0.8235	0.99	100.00%	97.06%

Notes: KMO, Kaiser-Meyer-Olkin measure of sampling adequacy; α, Cronbach's alpha; AUC, area under the receiver operating characteristic (ROC) curve

ID:

FAMILY RELATIONSHIPS IN CHILDHOOD

CECA-Q3[1]

This questionnaire concerns aspects of childhood. We are equally interested in people with TYPICAL OR ATYPICAL experience.

We would be very grateful if you could fill in <u>all</u> of the following questions about yourself.

Your gender:
(Please circle) MALE/ FEMALE

Your current age:.....….

Today's date:.....…..
DD/MM/YY

[1] CECA.Q3 includes additional sections of psychological abuse and role reversal

1A. WHO BROUGHT YOU UP BEFORE AGE 17?

List the the **PARENT FIGURES** who brought you up in childhood for at least a year or longer. Circle any of those that apply:

Mother figure(s)	Father figure(s)
0. Birth mother	1. Birth father
1. Stepmother	2. Stepfather
2. Female relative……	3. Male Relative
3. Family friend (incl godparent)	4. Family friend
4. Foster mother	5. Foster father
5. Adoptive mother	6. Adoptive father
6. Other……	7. Other……

1B. Were you ever in a children's home or institution prior to age 17? **YES/NO** (Please circle) If yes:

What was the total length of time in the children's home?_____years

(Loss)

1C LOSS OF PARENT BEFORE AGE 17	**MOTHER**	**FATHER**
Did either parent die before you were age 17?	**YES/ NO**	**YES/ NO**
IF YES: What age were you?	**AGE.....**	**AGE.....**
Have you ever been separated from your parent for one year or more before age 17?	**YES/ NO**	**YES/ NO**
IF SEPARATED:	**MOTHER**	**FATHER**
At what age were you first separated?	**AGE.....**	**AGE**.....
How long was this separation?	**.....** **YEARS**	**.....** **YEARS**
What was the reason for separation? (please circle)	1. Illness 2. Work 3. Divorce/ separation 4. Never knew parent 5. Abandoned 6.Other reason	1. Illness 2. Work 3. Divorce/ separation 4. Never knew parent 5. Abandoned 6.Other reason

Please describe your experience.....

2A. AS YOU REMEMBER YOUR MOTHER FIGURE IN YOUR FIRST 17 YEARS: Please circle the appropriate number. If you more than one mother figure, choose the one you were with longest, or the one you found most difficult to live with.

WHICH MOTHER FIGURE ARE YOU DESCRIBING BELOW?

1. Birth mother
2. Step-mother/father's live-in partner
3. Other relative e.g. aunty, grandmother
4. Other non-relative e.g. foster mother, godmother 5. Other (describe).....

(Neg/Ant)		YES DEFINITELY		UNSURE		NO NOT AT ALL
1.	She was very difficult to please.....	5	4	3	2	1
2.	She was concerned about my worries.....	5	4	3	2	1
3.	She was interested in how I did at school.	5	4	3	2	1
4.	She made me feel unwanted.....	5	4	3	2	1
5.	She tried to make me feel better when I was upset.....	5	4	3	2	1
6.	She was very critical of me.....	5	4	3	2	1
7.	She would leave me unsupervised before I was 10 years old.....	5	4	3	2	1
8.	She would usually have time to talk to me	5	4	3	2	1
9.	At times she made me feel I was a nuisance	5	4	3	2	1
10.	She often picked on me unfairly.....	5	4	3	2	1
11.	She was there if I needed her.....	5	4	3	2	1
12.	She was interested in who my friends were	5	4	3	2	1
13.	She was concerned about my whereabouts..	5	4	3	2	1
14.	She cared for me when I was ill.....	5	4	3	2	1
15.	She neglected my basic needs (e.g. food and clothes)	5	4	3	2	1
16.	She did not like me as much as my brothers and sisters..... (Leave blank if no siblings)	5	4	3	2	1

Do you want to add anything else about your mother?.....

2B. The following items describe some behaviours that can occur from parents. Did your mother/mother figure ever act like this towards you?

(Please circle the appropriate response)

(Psychab)

					HOW FREQUENT ?			
1	She would tease me	Yes	Unsure	No	Never	Once	Rarely	Often
2	She made me keep secrets	Yes	Unsure	No	Never	Once	Rarely	Often
3	She undermined my confidence	Yes	Unsure	No	Never	Once	Rarely	Often
4	She would confuse me by telling me to do contradictory things	Yes	Unsure	No	Never	Once	Rarely	Often
5	She played on my fears	Yes	Unsure	No	Never	Once	Rarely	Often
6	She liked to see me suffer	Yes	Unsure	No	Never	Once	Rarely	Often
7.	She humiliated me, put me down	Yes	Unsure	No	Never	Once	Rarely	Often
8.	She would shame me in front of others.	Yes	Unsure	No	Never	Once	Rarely	Often
9	She was very rejecting	Yes	Unsure	No	Never	Once	Rarely	Often
10	She took away the things I cherished	Yes	Unsure	No	Never	Once	Rarely	Often
11	She would make me eat things I didn't like until I was sick…	Yes	Unsure	No	Never	Once	Rarely	Often
12.	She would deliberately deprive me of light, food or company	Yes	Unsure	No	Never	Once	Rarely	Often
13	She would not let me mix with people I wanted to see	Yes	Unsure	No	Never	Once	Rarely	Often
14	She would make me feel guilty so I would do what I was told	Yes	Unsure	No	Never	Once	Rarely	Often
15.	She threatened to hurt the people dear to me to get what she wanted	Yes	Unsure	No	Never	Once	Rarely	Often
16	She forced me to steal or break the law for her	Yes	Unsure	No	Never	Once	Rarely	Often
17	She said she wanted me dead	Yes	Unsure	No	Never	Once	Rarely	Often

If any of these occurred: What age were you when it started?_____years old

Is there anymore you want to say about these experiences?,.....

3A. AS YOU REMEMBER YOUR FATHER FIGURE IN YOUR FIRST 17 YEARS

Please circle the appropriate number. If you had more than one father figure, choose the one you were with longest, or the one you found the most difficult to live with. If you had no father in the household then leave out this section.

WHICH FATHER FIGURE ARE YOU DESCRIBING BELOW?

1. Birth father
2. Step-father/ mother's live-in partner
3. Other relative e.g. uncle, grandfather
4. Other non-relative e.g. foster father, adoptive father 5. Other (describe).....

(Neg/Ant)		YES DEFINITELY		UNSURE	NO NOT AT ALL	
1.	He was very difficult to please.....	5	4	3	2	1
2.	He was concerned about my worries.....	5	4	3	2	1
3.	He was interested in how I did at school..	5	4	3	2	1
4.	He made me feel unwanted.....	5	4	3	2	1
5.	He tried to make me feel better when I was upset.....	5	4	3	2	1
6.	He was very critical of me.....	5	4	3	2	1
7.	He would leave me unsupervised before I was 10 years old.....	5	4	3	2	1
8.	He would usually have time to talk to me	5	4	3	2	1
9.	At times he made me feel I was a nuisance	5	4	3	2	1
10.	He often picked on me unfairly.....	5	4	3	2	1
11.	He was there if I needed him.....	5	4	3	2	1
12.	He was interested in who my friends were	5	4	3	2	1
13.	He was concerned about my whereabouts..	5	4	3	2	1
14.	He cared for me when I was ill.....	5	4	3	2	1
15.	He neglected my basic needs (e.g. food and clothes)	5	4	3	2	1
16.	He did not like me as much as my brothers and sisters..... (Leave blank if no siblings)	5	4	3	2	1

Do you want to add anything about your father?.....

3B. The following items describe some behaviours that can occur from parents. Did your father/father figure ever act like this towards you ?

(Please circle the appropriate descriptor)

(Psychab)

					HOW FREQUENT ?			
1	He would tease me	Yes	Unsure	No	Never	Once	Rarely	Often
2	He made me keep secrets	Yes	Unsure	No	Never	Once	Rarely	Often
3	He undermined my confidence	Yes	Unsure	No	Never	Once	Rarely	Often
4	He would confuse me by telling me to do contradictory things	Yes	Unsure	No	Never	Once	Rarely	Often
5	He played on my fears	Yes	Unsure	No	Never	Once	Rarely	Often
6	He liked to see me suffer	Yes	Unsure	No	Never	Once	Rarely	Often
7.	He humiliated me, put me down	Yes	Unsure	No	Never	Once	Rarely	Often
8.	He would shame me in front of others.	Yes	Unsure	No	Never	Once	Rarely	Often
9	He was very rejecting	Yes	Unsure	No	Never	Once	Rarely	Often
10	He took away the things I cherished	Yes	Unsure	No	Never	Once	Rarely	Often
11	He would make me eat things I didn't like until I was sick…	Yes	Unsure	No	Never	Once	Rarely	Often
12.	He would stop me having light, food or company	Yes	Unsure	No	Never	Once	Rarely	Often
13	He would not let me mix with people I wanted to see	Yes	Unsure	No	Never	Once	Rarely	Often
14	He would make me feel guilty so I would do what I was told	Yes	Unsure	No	Never	Once	Rarely	Often
15.	He threatened to hurt the people dear to me to get what he wanted	Yes	Unsure	No	Never	Once	Rarely	Often
16	He forced me to steal or break the law for her	Yes	Unsure	No	Never	Once	Rarely	Often
17	He said he wanted me dead	Yes	Unsure	No	Never	Once	Rarely	Often

If any of these occurred at what age were you when it started?_____years old

Is there anything else you would like to say about these experiences?.....

3C . Did you do the following as a child or young person before age 17?

(RR)		YES DEFINITELY		UNSURE	NO	NOT AT ALL
1.	Did you have a lot of responsibility in the home as a child, more than other children your age?	5	4	3	2	1
2.	Were you expected to do a lot of housework, more than other children your age?	5	4	3	2	1
3.	Did you have to look after younger siblings, more than other children your age?	5	4	3	2	1
4	Were you responsible for cooking and cleaning the home?	5	4	3	2	1
5	Did you ever miss school because of responsibilities at home?	5	4	3	2	1
6	Did you ever miss out on seeing friends because of responsibilities at home?	5	4	3	2	1
7.	Did your parent/s ever say they couldn't cope with looking after you when you were a child?	5	4	3	2	1
8.	Did your parent/s look to you for help as a child?	5	4	3	2	1
9.	Could your parent/s cope if you hurt yourself or were ill?	5	4	3	2	1
10.	Did your parent ever confide their problems in you?	5	4	3	2	1
11.	Did your parent/s rely you for emotional support when you were a child?	5	4	3	2	1
12.	Would your parent cry in front of you?	5	4	3	2	1
13	Did you feel concerned and worried about your parent when you were a child?	5	4	3	2	1
14.	Did you try to support and care for your parent?	5	4	3	2	1
15	Did you try to make your parent smile or laugh when s/he was upset?	5	4	3	2	1
16.	Did your parent try to make you feel guilty about the sacrifices they had made for you?	5	4	3	2	1
17.	Did you ever have to keep secrets for your parent/s?	5	4	3	2	1

Which parent did you have to provide care for? Mother figure/ Father figure /Both/Other

Did your parent have emotional or mental health problems? YES/ UNSURE/ NO

Did your parent have disability or physical illness YES / UNSURE/ NO

4. CLOSE RELATIONSHIPS IN CHILDHOOD

(Please circle as appropriate)

(SUPP)

When you were a child or teenager, were there any **ADULTS** you could go to with your problems or to discuss your feelings? **YES/ NO**

IF YES: Who was that?

(Circle more than one if relevant)

1. Mother/ mother figure
2. Father/ father figure
3. Other relative
4. Family friend
5. Teacher, vicar, etc
6. Other (describe).....

Do you want to note anything about the relationship(s)?.....

Were there other CHILDREN/TEENAGERS your age that you could discuss your problems and feelings with? YES/NO

IF YES: Who was that?

(Circle more than one if relevant)

1. Sister
2. Brother
3. Other relative
4. Close friend
5. Other less close friend(s)
6. Other person (describe).....

Do you want to note anything about the relationship(s)?.....

Who would you describe as the **TWO CLOSEST** people to you as a child/teenager?

(Circle up to two)

1. Mother/ mother figure
2. Father/ father figure
3. Sister or brother
4. Other relative
5. Family friend (adult)
6. Friend your age
7. Other (describe).....

Do you want to note anything about the relationship(s)?.....

5. PHYSICAL PUNISHMENT BEFORE AGE 17 BY PARENT FIGURE OR OTHER HOUSEHOLD MEMBER

(Phyab)

When you were a child or teenager were you ever hit repeatedly with an implement (such as a belt or stick) or punched, kicked or burnt by someone in the household? **YES/ NO**

IF NO THEN SKIP TO 6 OVERLEAF:

IF 'YES'	**MOTHER FIGURE**	**FATHER FIGURE**
How old were you when it began?	**AGE**.....	**AGE**.....
Did the hitting happen on more than one occasion?	**YES/ NO**	**YES/ NO**
How were you hit?	**1.Belt or stick** **2.Punched/kicked** **3.Hit with hand** **4.Other**	**1.Belt or stick** **2.Punched/kicked** **3.Hit with hand** **4.Other**
Were you ever injured e.g. bruises, black eyes, broken limbs?	**YES/ NO**	**YES/ NO**
Was this person so angry they seemed out of control?	**YES/ NO**	**YES/ NO**

Can you describe these experiences?.....

Did you experience this from anyone else in the household? **YES/ NO**

IF YES: DESCRIBE BELOW

6. UNWANTED SEXUAL EXPERIENCES BEFORE AGE 17

(Please circle as appropriate)

When you were a child or teenager did you ever have any unwanted sexual experiences? **YES/ NO/ UNSURE**

Did anyone force you or persuade you have sexual intercourse against your wishes before age 17? YES/ NO/ UNSURE

Can you think of any upsetting sexual experiences before age 17 with a related adult or someone in authority e.g.teacher? YES/ NO/ UNSURE

IF NONE THEN SKIP TO END.

IF 'YES' OR 'UNSURE' TO ABOVE THEN COMPLETE THE FOLLOWING:

AGE

How old were you when it began?

OTHER EXPERIENCE

Was the other person someone you knew? YES/ NO

Was the other person a relative? YES/ NO

Did the other person live in your household? YES/ NO

Did this person do it to you on more than one occasion? YES/ NO

Did it involve touching private parts of your body? YES/ NO

Did it involve sexual intercourse? **YES/ NO**

Can you describe these experiences?.....

THANK YOU!

Thank you for your help with this questionnaire.

We realise that it is difficult to give a true picture of your true childhood experience in a questionnaire, so if you have any comments you would like to add, please write them below.

Your response will be treated in the strictest confidence.

Any other comments:

Appendix 2. Subscale items' status (kept/removed) in the CECA.Q3-BF

Antipathy		
Mother	Father	
Kept	Kept	1. She/He was very difficult to please.
Kept	Removed	2. She/He made me feel unwanted.
Kept	Kept	3. She/He was very critical of me.
Removed	Removed	4. She/He would usually have time to talk to me.
Kept	Kept	5. At times she/he made me feel I was a nuisance.
Kept	Kept	6. She/He often picked on me unfairly.
Removed	Kept	7. She/He was there if I needed her.
Kept	Kept	8. She/He did not like me as much as my brothers and sisters (leave blank if no siblings).
Neglect		
Mother	Father	
Kept	Kept	1. She/He was concerned about my worries.
Removed	Kept	2. She/He was interested in how I did at school.
Kept	Kept	3. She/He tried to make me feel better when I was upset.
Removed	Removed	4. She/He would leave me unsupervised before I was 10 years old.
Kept	Kept	5. She/He was interested in who my friends were.
Kept	Kept	6. She/He was concerned about my whereabouts.
Kept	Kept	7. She/He cared for me when I was ill.
Removed	Removed	8. She/He neglected my basic needs (e.g. food and clothes).
Psychological abuse		
Mother	Father	
Removed	Removed	1. She/He would tease me.
Removed	Removed	2. She/He made me keep secrets.
Kept	Kept	3. She/He undermined my confidence.
Kept	Removed	4. She/He would confuse me by telling me to do contradictory things.
Kept	Kept	5. She/He played on my fears.
Removed	Kept	6. She/He liked to see me suffer.
Kept	Kept	7. She/He humiliated me, put me down.
Kept	Kept	8. She/He would shame me in front of others.
Kept	Kept	9. She/He was very rejecting.
Removed	Kept	10. She/He took away the things I cherished.
Removed	Removed	11. She/He would make me eat things I didn't like until I was sick.
Kept	Removed	12. She/He would deliberately deprive me of light, food, or company.
Removed	Removed	13. She/He would not let me meet with people I wanted to see.
Kept	Kept	14. She/He would make me feel guilty, so I would do what I was told.

Kept	Removed	15. She/He threatened to hurt the people dear to me to get what she wanted.
Kept	Removed	16. She/He forced me to steal or break the law for her.
Kept	Removed	17. She/He said she wanted me dead.
Role reversal		
Kept		1. Did you have a lot of responsibility in the home as a child, more than other children your age?
Kept		2. Were you expected to do a lot of housework, more than other children your age?
Kept		3. Did you have to look after younger siblings, more than other children your age?
Removed		4. Were you responsible for cooking and cleaning the home?
Removed		5. Did you ever miss school because of responsibilities at home?
Kept		6. Did you ever miss out on seeing friends because of responsibilities at home?
Removed		7. Did your parent/s ever say they couldn't cope with looking after you when you were a child?
Kept		8. Did your parent/s look to you for help as a child?
Removed		9. Could your parent/s cope if you hurt yourself or were ill?
Kept		10. Did your parent ever confide their problems in you?
Kept		11. Did your parent/s rely you for emotional support when you were a child?
Removed		12. Would your parent cry in front of you?
Kept		13. Did you feel concerned and worried about your parent when you were a child?
Removed		14. Did you try to support and care for your parent?
Removed		15. Did you try to make your parent smile or laugh when s/he was upset?
Removed		16. Did your parent try to make you feel guilty about the sacrifices they had made for you?
Removed		17. Did you ever have to keep secrets for your parent/s?
Kept		18. Which parent did you have to provide care for?
Removed		19. Did your parent have emotional or mental health problems?
Removed		20. Did your parent have disability or physical illness?

Appendix 3. Factor analysis of the remaining items in CECA.Q3

Items	n	Mean	S.D.	Rotated factor loading				Uniqueness	Communality
				Factor 1	Factor 2	Factor 3	Factor 4		
Antipathy mother (cut-off scores for factor loading = 0.60)									
1. She was very difficult to please.	101	2.58	1.50	0.75				0.42	0.58
2. She made me feel unwanted.	102	1.87	1.32	0.79				0.39	0.61
3. She was very critical of me.	102	2.80	1.48	0.70				0.46	0.54
5. At times she made me feel I was a nuisance.	102	2.20	1.40	0.77				0.41	0.59
6. She often picked on me unfairly.	102	2.11	1.41	0.80				0.33	0.67
8. She did not like me as much as my brothers and sisters (leave blank if no siblings).	89	1.89	1.35	0.77				0.40	0.60
Antipathy father (cut-off scores for factor loading = 0.60)									
1. He was very difficult to please.	100	3.09	1.64	0.61				0.45	0.55
3. He was very critical of me.	98	2.84	1.53			0.94		0.00	1.00
5. At times he made me feel I was a nuisance.	98	2.17	1.48					0.48	0.52
6. He often picked on me unfairly.	99	2.12	1.49	0.67				0.46	0.54
7. He was there if I needed her.	96	2.67	1.55		0.97			0.00	1.00
8. He did not like me as much as my brothers and sisters (leave blank if no siblings).	88	1.89	1.41	0.70				0.45	0.55
Neglect mother (cut-off scores for factor loading = 0.55)									
1. She was concerned about my worries.	101	2.12	1.28		0.73			0.42	0.58
3. She tried to make me feel better when I was upset.	101	2.13	1.28		0.88			0.19	0.81
5. She was interested in who my friends were.	101	1.97	1.16	0.70				0.40	0.60
6. She was concerned about my whereabouts.	102	1.70	0.97	0.96				0.06	0.94
7. She cared for me when I was ill.	102	1.43	0.83	0.55				0.62	0.38
Neglect father (cut-off scores for factor loading = 0.54)									
1. He was concerned about my worries.	100	2.54	1.51	0.83				0.31	0.69
2. He was interested in how I did at school.	100	2.12	1.39	0.83				0.31	0.69

3. He tried to make me feel better when I was upset.	99	2.52	1.48	0.90				0.20	0.80
5. He was interested in who my friends were.	100	2.72	1.59	0.76				0.42	0.58
6. He was concerned about my whereabouts.	99	2.38	1.54	0.69				0.53	0.47
7. He cared for me when I was ill.	99	2.65	1.62	0.78				0.39	0.61
Psychological abuse mother (cut-off scores for factor loading = 0.60)									
3. She undermined my confidence.	98	0.69	0.89	0.76				0.39	0.61
4. She would confuse me by telling me to do contradictory things.	98	0.44	0.76	0.67				0.47	0.53
5. She played on my fears.	98	0.44	0.77	0.64				0.46	0.54
7. She humiliated me, put me down.	96	0.46	0.79	0.63				0.20	0.80
8. She would shame me in front of others.	96	0.47	0.81				0.80	0.00	1.00
9. She was very rejecting.	98	0.41	0.76	0.62				0.43	0.57
12. She would deliberately deprive me of light, food, or company.	98	0.14	0.50		0.95			0.00	1.00
14. She would make me feel guilty, so I would do what I was told.	97	0.90	0.94	0.65				0.52	0.48
15. She threatened to hurt the people dear to me to get what she wanted.	97	0.03	0.17			0.78		0.38	0.62
16. She forced me to steal or break the law for her.	97	0.01	0.10			0.65		0.56	0.44
17. She said she wanted me dead.	96	0.08	0.37		0.61			0.55	0.45
Psychological abuse father (cut-off scores for factor loading = 0.60)									
3. He undermined my confidence.	89	0.72	0.90	0.73				0.35	0.65
5. He played on my fears.	91	0.46	0.81	0.62				0.33	0.67
6. He liked to see me suffer.	92	0.20	0.50		0.97			0.02	0.98
7. He humiliated me, put me down.	90	0.51	0.82	0.70				0.28	0.72
8. He would shame me in front of others.	91	0.53	0.85	0.75				0.22	0.78
9. He was very rejecting.	92	0.52	0.82	0.64				0.42	0.58
10. He took away the things I cherished.	90	0.41	0.75	0.62				0.43	0.57

14. He would make me feel guilty, so I would do what I was told.	90	0.66	0.93	0.71		0.35	0.65
Role reversal (cut-off scores for factor loading = 0.60)							
1. Did you have a lot of responsibility in the home as a child, more than other children your age?	83	2.33	1.62		0.80	0.33	0.67
2. Were you expected to do a lot of housework, more than other children your age?	83	2.11	1.50		0.91	0.17	0.83
3. Did you have to look after younger siblings, more than other children your age?	80	1.75	1.35			0.64	0.36
6. Did you ever miss out on seeing friends because of responsibilities at home?	83	2.08	1.48			0.62	0.38
8. Did your parent/s look to you for help as a child?	82	2.40	1.59	0.61		0.47	0.53
10. Did your parent ever confide their problems in you?	83	2.69	1.58	0.84		0.29	0.71
11. Did your parent/s rely you for emotional support when you were a child?	82	2.45	1.63	0.84		0.29	0.71
13. Did you feel concerned and worried about your parent when you were a child?	83	3.37	1.61	0.68		0.52	0.48
18. Which parent did you have to provide care for?	46	2.00	1.12	(not included in the factor analysis due to too much missing)			

Note: Principle component factor analysis with varimax rotation were performed; factor loadings < cut-off scores are suppressed.

Appendix 4. Covariance of CECA.Q3 items by subscale (Antipathy, Neglect, Psychological abuse, and Role reversal)

1. Antipathy mother
   a. Covariance

	CECAQ71	CECAQ74	CECAQ76	CEC~78_R	CECAQ79	CECAQ710	CE~711_R	CECAQ716
CECAQ71	2.15622							
CECAQ74	1.03239	1.72832						
CECAQ76	1.64786	.876698	2.17764					
CECAQ78_R	.756531	.670846	.77325	1.68234				
CECAQ79	.956374	1.02978	1.17607	.702194	1.87239			
CECAQ710	1.30225	1.26907	1.31818	.838036	1.34888	1.8494		
CECAQ711_R	.892111	.985893	.700627	1.17555	.933255	1.02939	1.78252	
CECAQ716	1.00131	1.10084	1.05695	.750261	1.20624	1.30238	.888845	1.83999

   b. Expectation-maximization (EM) covariance

	CECAQ71	CECAQ74	CECAQ76	CECAQ78_R	CECAQ79	CECAQ710	CECAQ711_R	CECAQ716
CECAQ71	2.2088955							
CECAQ74	1.1381982	1.7190504						
CECAQ76	1.6241546	.88677432	2.1576317					
CECAQ78_R	.87831765	.76922338	.82218378	1.6763745				
CECAQ79	1.052316	1.0936178	1.1757017	.7562476	1.9419454			
CECAQ710	1.2312248	1.2098231	1.1191849	.74730873	1.2337562	1.9589581		
CECAQ711_R	1.0384257	1.0727605	.77181853	1.2498078	.99288735	.96030373	1.818243	
CECAQ716	1.0353187	1.1117755	.99995336	.76156736	1.2078985	1.2772042	.91187441	1.821549

2. Antipathy father
   a. Covariance

	CECAQ141	CECAQ144	CECAQ146	CEC~48_R	CECAQ149	CEC~1410	CE~411_R	CEC~1416
CECAQ141	2.73833							
CECAQ144	1.19813	1.69121						
CECAQ146	1.63746	.849895	2.35727					
CECAQ148_R	1.30985	.913279	.465221	2.34508				
CECAQ149	1.3231	1.16305	1.18142	1.02981	2.26513			
CECAQ1410	1.59952	1.29765	1.22749	.928636	1.3103	2.29645		
CECAQ1411_R	1.11683	.995483	.854863	1.53418	1.17555	1.01596	2.4324	
CECAQ1416	1.25233	1.02334	.7972	.984944	1.09711	1.27145	.860584	2.04953

   b. EM covariance

	CECAQ141	CECAQ144	CECAQ146	CECAQ148_R	CECAQ149	CECAQ1410	CECAQ1411_R	CECAQ1416
CECAQ141	2.6619							
CECAQ144	1.1391493	1.9158606						
CECAQ146	1.3998752	.79211813	2.3048011					
CECAQ148_R	1.0559414	.81577164	.38686267	2.3811534				
CECAQ149	1.1577751	1.0170595	1.2066897	.87591759	2.1535457			
CECAQ1410	1.3030328	.96742192	1.1093929	.65741391	1.1498535	2.213096		
CECAQ1411_R	.88206429	1.0647458	.71888494	1.433725	.94169484	.68889056	2.3792956	
CECAQ1416	1.1147293	.91352548	.75707967	.80260318	1.0262082	1.137541	.69724528	1.914454

3. Neglect mother

a. Covariance

	CEC~72_R	CEC~73_R	CEC~75_R	CECAQ77	CE~712_R	CE~713_R	CE~714_R	CECAQ715
CECAQ72_R	1.57646							
CECAQ73_R	.451997	1.06594						
CECAQ75_R	1.03479	.368664	1.51396					
CECAQ77	.244738	.054231	.255155	1.87113				
CECAQ712_R	.565077	.521907	.637994	.3314	1.38445			
CECAQ713_R	.399055	.558634	.399055	.211125	.845146	.978308		
CECAQ714_R	.270296	.229811	.239046	.096757	.48067	.486254	.613402	
CECAQ715	.054875	.190399	.023625	.076031	.194265	.125644	.072809	.463058

b. EM covariance

	CECAQ72_R	CECAQ73_R	CECAQ75_R	CECAQ77	CECAQ712_R	CECAQ713_R	CECAQ714_R	CECAQ715
CECAQ72_R	1.6019193							
CECAQ73_R	.43467239	1.0302044						
CECAQ75_R	1.0973982	.34593353	1.6103891					
CECAQ77	.2338316	.04504842	.30790634	1.8874471				
CECAQ712_R	.54266209	.49647307	.63616907	.35909029	1.3353077			
CECAQ713_R	.37880542	.53937636	.36850957	.18502499	.80108688	.93704344		
CECAQ714_R	.3510477	.21198412	.34988917	.10803537	.46745069	.45463283	.67666282	
CECAQ715	.07581873	.18621143	.05008159	.07457281	.1883431	.12193647	.08892527	.4472941

4. Neglect father

a. Covariance

	CEC~42_R	CEC~43_R	CEC~45_R	CECAQ147	CE~412_R	CE~413_R	CE~414_R	CEC~1415
CECAQ142_R	2.2943							
CECAQ143_R	1.46557	1.94989						
CECAQ145_R	1.74737	1.61579	2.18947					
CECAQ147	.854605	.378618	.668421	2.25954				
CECAQ1412_R	1.49079	1.49539	1.51579	.354605	2.49079			
CECAQ1413_R	1.32895	1.38026	1.26316	.540789	1.78158	2.36316		
CECAQ1414_R	1.55022	1.45274	1.81579	.545066	1.45724	1.18816	2.63936	
CECAQ1415	.62193	.663596	.536842	.296053	.407895	.552632	.54693	.945614

b. EM covariance

	CECAQ142_R	CECAQ143_R	CECAQ145_R	CECAQ147	CECAQ1412_R	CECAQ1413_R	CECAQ1414_R	CECAQ1415
CECAQ142_R	2.2484							
CECAQ143_R	1.3552	1.9256						
CECAQ145_R	1.7254166	1.5068118	2.1544803					
CECAQ147	.86529567	.31798043	.68618889	2.2274403				
CECAQ1412_R	1.4512	1.4536	1.4897467	.34906383	2.5016			
CECAQ1413_R	1.2341051	1.3829587	1.1830917	.47621182	1.7667603	2.3442034		
CECAQ1414_R	1.5248807	1.3920297	1.7859676	.54791379	1.4774027	1.1645331	2.6022931	
CECAQ1415	.58190075	.63819144	.50429469	.27526064	.37230062	.52347842	.50753043	.92042169

5. Psychological abuse mother

a. Covariance

	CECAQ91	CECAQ92	CECAQ93	CECAQ94	CECAQ95	CECAQ96	CECAQ97	CECAQ98	CECAQ99	CECAQ910	CECAQ911	CECAQ912	CECAQ913	CECAQ914	CECAQ915
CECAQ91	.657303														
CECAQ92	.297753	.72422													
CECAQ93	.269663	.299625	.764045												
CECAQ94	.213483	.169788	.385768	.586767											
CECAQ95	.213483	.214232	.382022	.307116	.633708										
CECAQ96	.101124	.097129	.217228	.234707	.219476	.237703									
CECAQ97	.247191	.281648	.393258	.385768	.408989	.219476	.633708								
CECAQ98	.235955	.281648	.393258	.385768	.386517	.219476	.555056	.65618							
CECAQ99	.044944	.102871	.400749	.304619	.373783	.238702	.351311	.362547	.606242						
CECAQ910	.146067	.160549	.344569	.267166	.337828	.205743	.315356	.382772	.342572	.478901					
CECAQ911	.101124	.165044	.142322	.132335	.196255	.09563	.173783	.218727	.158302	.191261	.245194				
CECAQ912	.089888	.108864	.153558	.166042	.196255	.15181	.207491	.173783	.214482	.202497	.132834	.267665			
CECAQ913	.168539	.156554	.269663	.220974	.253933	.128839	.197753	.265169	.232959	.268914	.15206	.15206	.65618		
CECAQ914	.230337	.278027	.453184	.403246	.4397	.190512	.4397	.394757	.366792	.2799	.176529	.176529	.290637	.872534	
CECAQ915	.022472	.021973	.029963	.02372	.011985	.018477	.023221	.034457	.035456	.036954	.030212	.00774	.021723	.025218	.021973
CECAQ916	.005618	.005368	.014981	.017478	.017228	.009238	.005993	.017228	.017728	.018477	.020724	.009488	.016479	.012609	.010986
CECAQ917	.033708	.076654	.097378	.072409	.115356	.085144	.10412	.115356	.119351	.102871	.075905	.132085	.086891	.100874	.009238

	CECAQ916	CECAQ917
CECAQ916	.011111	
CECAQ917	.010237	.149313

b. EM covariance

	CECAQ91	CECAQ92	CECAQ93	CECAQ94	CECAQ95	CECAQ96	CECAQ97	CECAQ98	CECAQ99	CECAQ910	CECAQ911
CECAQ91	.61277489										
CECAQ92	.26123844	.75164913									
CECAQ93	.26094855	.32685046	.7889459								
CECAQ94	.19019652	.1902443	.36609056	.56917651							
CECAQ95	.1975298	.172548	.32885829	.27297634	.5904785						
CECAQ96	.09531771	.08231082	.19297366	.21196906	.20165848	.21751424					
CECAQ97	.23029874	.25793373	.39083483	.33182555	.36492226	.19636855	.62967991				
CECAQ98	.20840844	.25469332	.37453058	.32605318	.34494911	.19337301	.54678804	.6475887			
CECAQ99	.03973175	.10987688	.37916429	.28704708	.33870296	.21755694	.32284805	.32880718	.56525976		
CECAQ910	.12440888	.11745786	.27585337	.22829414	.30961123	.18450087	.27206513	.33492989	.30105588	.47498182	
CECAQ911	.0833074	.13618813	.10938983	.11194462	.1908005	.08243132	.15500201	.20712203	.13556655	.18361061	.25814791
CECAQ912	.08362687	.09457466	.1345093	.15027451	.18016435	.13856943	.18587329	.15319308	.19504874	.18204611	.11853678
CECAQ913	.1430667	.16972702	.2525082	.21963732	.22617195	.10781103	.14583404	.21949694	.20340283	.25167126	.16029721
CECAQ914	.19685278	.25425649	.43345123	.35990345	.39466011	.16563364	.43231757	.40662268	.33739828	.23426014	.17708535
CECAQ915	.01521565	.01338003	.01535265	.01667308	.00739921	.01504558	.01604989	.02643098	.02770983	.05102932	.02743656
CECAQ916	.00504678	.00517775	.01368187	.016385	.01556141	.00838182	.00504587	.01509536	.01630644	.01647894	.01859885
CECAQ917	.03205325	.06610998	.08496613	.06487938	.1062131	.07785366	.09328231	.10266641	.10822027	.09262505	.06822617

	CECAQ912	CECAQ913	CECAQ914	CECAQ915	CECAQ916	CECAQ917
CECAQ912	.24372769					
CECAQ913	.13120899	.670049				
CECAQ914	.15481582	.26316327	.87150168			
CECAQ915	.00555192	.02464654	.01411466	.02987584		
CECAQ916	.0086047	.0149667	.0112155	.00986006	.01014951	
CECAQ917	.12035054	.07480476	.08852783	.00758246	.00929213	.13726264

6. Psychological abuse father

a. Covariance

	CECAQ161	CECAQ162	CECAQ163	CECAQ164	CECAQ165	CECAQ166	CECAQ167	CECAQ168	CECAQ169	CEC~1610	CEC~1611	CEC~1612	CEC~1613	CEC~1614	CEC~1615	CEC~1616
CECAQ161	.820235															
CECAQ162	.171334	.515507														
CECAQ163	.433905	.201144	.82159													
CECAQ164	.302921	.099669	.370521	.461457												
CECAQ165	.320687	.110509	.477266	.375489	.646793											
CECAQ166	.141223	.047877	.20551	.210328	.234267	.209124										
CECAQ167	.37037	.061728	.561728	.364198	.395062	.216049	.697531									
CECAQ168	.444444	.061728	.537037	.388889	.493827	.216049	.574074	.697531								
CECAQ169	.36224	.008431	.417043	.372779	.438723	.214092	.444444	.481481	.672689							
CECAQ1610	.266787	.052093	.438723	.328817	.398073	.180367	.345679	.407407	.352906	.566697						
CECAQ1611	.174044	.039446	.165011	.177055	.153568	.112316	.17284	.148148	.146341	.148449	.225233					
CECAQ1612	.099669	.063535	.142276	.114273	.121349	.105842	.166667	.141975	.115929	.126769	.119542	.197681				
CECAQ1613	.123457	.061728	.179012	.092593	.259259	.092593	.141975	.203704	.074074	.222222	.08642	.117284	.697531			
CECAQ1614	.486902	-.026197	.545017	.364649	.493526	.215297	.506173	.530864	.498043	.427281	.174044	.149051	.246914	.869618		
CECAQ1615	.115929	.059018	.098314	.097109	.120446	.09741	.104938	.104938	.128576	.062933	.073773	.064589	.055556	.115929	.128425	
CECAQ1616	.066245	.033725	.063234	.08371	.026498	.016862	.074074	.074074	.073472	.07829	.02981	.031617	4.1e-18	.066245	.020476	.071665
CECAQ1617	.062331	.025896	.094851	.100873	.113821	.087022	.111111	.111111	.110208	.055706	.038543	.041253	.061728	.099368	.043059	.021078

	CEC~1617
CECAQ1617	.118037

b. EM covariance

	CECAQ161	CECAQ162	CECAQ163	CECAQ164	CECAQ165	CECAQ166	CECAQ167	CECAQ168	CECAQ169	CECAQ1610	CECAQ1611	CECAQ1612
CECAQ161	.77684933											
CECAQ162	.12890581	.52329791										
CECAQ163	.40942099	.178839	.80063232									
CECAQ164	.29929146	.08751512	.37932257	.50843923								
CECAQ165	.33347441	.08122176	.46570815	.3902377	.64182265							
CECAQ166	.15760691	.02702184	.21020623	.23432239	.2560182	.24319001						
CECAQ167	.35516825	.03184101	.54649917	.39235822	.40410948	.24998477	.70642958					
CECAQ168	.42310188	.03375199	.50278448	.41005292	.48904885	.25344098	.58735565	.70539235				
CECAQ169	.34187073	-.01826846	.42263414	.35707937	.42538959	.21050855	.43770077	.44617519	.6578792			
CECAQ1610	.27916461	.03395305	.41950109	.33785239	.4021934	.19921693	.34366678	.39956257	.33281815	.54749961		
CECAQ1611	.15238624	.01877372	.15503221	.180771	.16001424	.13245096	.20983627	.1914537	.14929384	.13621052	.27451093	
CECAQ1612	.12913086	.04193007	.17589629	.17090743	.17584682	.15044636	.21585523	.18723345	.14456886	.16104105	.13902295	.25446429
CECAQ1613	.14839925	.03793509	.16480973	.11672385	.27676211	.13948668	.17973082	.25381876	.06779347	.23612812	.12102976	.14910848
CECAQ1614	.47398151	-.04559309	.53682635	.38742986	.49441196	.22910626	.50545532	.51661149	.4872423	.42310426	.16913167	.19066492
CECAQ1615	.10408366	.05276488	.085777	.08354609	.10722208	.08537996	.08959115	.09052381	.11257899	.05617718	.06316316	.05519491
CECAQ1616	.05890828	.03003247	.05446784	.07196311	.02257886	.01327713	.06285809	.0633442	.06352416	.06899374	.02470232	.02626923
CECAQ1617	.05701222	.02304996	.0827142	.0874052	.1013828	.0763956	.09556878	.09655202	.09662729	.04976062	.03241608	.03481576

	CECAQ1613	CECAQ1614	CECAQ1615	CECAQ1616	CECAQ1617
CECAQ1613	.70825062				
CECAQ1614	.24803276	.84029501			
CECAQ1615	.05006217	.10213922	.11505529		
CECAQ1616	-.00017886	.05749222	.01831761	.06380599	
CECAQ1617	.05557333	.08777906	.03904899	.01886429	.10568148

7. Role reversal

a. Covariance

	CECAQ201	CECAQ202	CECAQ203	CECAQ204	CECAQ205	CECAQ206	CECAQ207	CECAQ208	CECAQ2~R	CEC~2010	CEC~2011	CEC~2012	CEC~2013	CEC~2014	CEC~2015	CEC~2016
CECAQ201	2.65254															
CECAQ202	1.73547	2.23787														
CECAQ203	1.01203	1.12643	1.91725													
CECAQ204	1.22455	1.12532	.668456	2.06831												
CECAQ205	.099408	.054239	.033136	.014994	.114217											
CECAQ206	1.15772	1.34136	.669011	.756016	.132544	2.34728										
CECAQ207	.410033	.601444	.223436	.281562	.070159	.647168	1.29156									
CECAQ208	1.09867	.8806	.589967	.744354	.090892	.784524	.276009	2.47334								
CECAQ209_R	.453351	.64291	.169382	.422251	.099037	.362458	.400037	.183451	1.48926							
CECAQ2010	.281933	-.1505	-.116068	.173084	.062384	.50833	.136431	1.15235	-.270455	2.3993						
CECAQ2011	.359496	.075898	-.039985	.128841	.057016	.182525	.224361	1.39541	-.051092	1.90337	2.54572					
CECAQ2012	.070159	.133839	-.410404	-.065716	-.08793	.344687	.242318	.423732	-.333765	.924287	.834506	2.4104				
CECAQ2013	.498889	.164198	.170863	-.0087	.006109	.79304	.247131	1.02573	-.07201	1.39522	1.3569	1.1579	2.59108			
CECAQ2014	.924843	.478341	.299148	.331359	.091448	.497964	.140318	1.18178	.033691	.891892	.963347	.865235	1.10811	2.26509		
CECAQ2015	.194002	.109959	.11033	.496853	.01518	.057756	-.1107	.345798	-.44502	.894484	.751944	.615698	.639763	.852277	2.17253	
CECAQ2016	1.07516	1.01481	.454276	.723436	.100333	1.31026	.667901	.900407	.226583	.546464	.611996	.490929	.686412	.652721	.421696	2.78563
CECAQ2017	.798408	.750648	.398556	.650315	.02314	1.10107	.446686	.892817	.358201	.654387	.600148	.395964	.633284	.868197	.418364	1.26879
CECAQ22	-.050722	-.065531	.005924	-.121066	-.042947	.17438	.03221	.19104	-.176601	.498334	.399111	.514624	.570159	.379859	.106257	.12699
CECAQ23	-.267679	-.188449	-.198815	-.199556	-.041466	.314328	.113291	.029989	-.114772	.022954	-.122917	.116623	.209922	-.041836	-.214365	.00074

	CEC~2017	CECAQ22	CECAQ23
CECAQ2017	2.85542		
CECAQ22	.264717	.795261	
CECAQ23	-.029248	.175491	.632358

b. EM covariance

	CECAQ201	CECAQ202	CECAQ203	CECAQ204	CECAQ205	CECAQ206	CECAQ207	CECAQ208	CECAQ209_R	CECAQ2010	CECAQ2011	CECAQ2012
CECAQ201	2.6050225											
CECAQ202	1.7840035	2.2171578										
CECAQ203	1.0402821	1.1355312	1.8238466									
CECAQ204	1.204529	1.112353	.6373289	1.9866454								
CECAQ205	.09304689	.05109595	.0312318	.01509653	.10132095							
CECAQ206	1.0930469	1.2318188	.62059395	.71389171	.12541733	2.1736101						
CECAQ207	.34562346	.50878212	.18082361	.22398026	.06372478	.58179707	1.2370446					
CECAQ208	1.0533353	.88099263	.58053881	.75039269	.07237689	.63864195	.2552847	2.5426882				
CECAQ209_R	.40005806	.56307156	.12231991	.49905647	.08854696	.36565539	.36725214	.22114957	1.4809116			
CECAQ2010	.37901002	.00987081	-.03220292	.30193061	.05051531	.44810568	.17811003	1.2299515	-.10857889	2.4801858		
CECAQ2011	.39028938	.15862538	-.01465267	.2411305	.04323747	.12217543	.2638802	1.5972726	.08189438	1.9586362	2.7221537	
CECAQ2012	.10484504	.16085396	-.36692425	.02148642	-.07733681	.29826861	.27808259	.56020555	-.2118244	.93999164	.99846256	2.3879912
CECAQ2013	.56524895	.27275367	.21186904	.08578894	.00464509	.71548846	.27188271	1.0688759	-.00029032	1.4061547	1.4191465	1.0851392
CECAQ2014	.96650362	.57373731	.36151689	.33598949	.0804533	.44575926	.18901109	1.2118921	.01618036	.93436715	1.0310313	.84179191
CECAQ2015	.21386586	.1508302	.13691213	.52246104	.00911896	.02602169	-.13373076	.42791487	-.33096297	.85707791	.75230665	.5265264
CECAQ2016	.86993758	.81608361	.33617008	.61953839	.08854696	1.1728843	.63231238	.86554817	.25199594	.45768617	.68970341	.47703403
CECAQ2017	.71098853	.67876325	.32168036	.58499056	.01654812	.89606619	.46029903	.94133828	.31673683	.59602264	.76372751	.51155196
CECAQ22	-.03959952	-.05371105	-.01947723	-.05508662	-.0373502	.15489503	.06126863	.20124709	-.09071335	.51805625	.44405765	.55001344
CECAQ23	-.22991255	-.16709882	-.17080887	-.1814479	-.03379838	.30038918	.10080606	-.00026517	-.10663129	-.01910813	-.14517632	.09246259

	CECAQ2013	CECAQ2014	CECAQ2015	CECAQ2016	CECAQ2017	CECAQ22	CECAQ23
CECAQ2013	2.5713456						
CECAQ2014	1.1781271	2.2288456					
CECAQ2015	.70930129	.84223059	2.1446706				
CECAQ2016	.77079402	.62245018	.42087952	2.75802			
CECAQ2017	.77035854	.90599068	.45329783	1.3167368	2.9243722		
CECAQ22	.53989358	.33561817	.07115692	.13977988	.31775165	.79660777	
CECAQ23	.17870249	-.03956188	-.19090617	.01035625	-.0303901	.14968396	.58168454