



Developing a Valid and Reliable Cross-cultural Measure of Coparenting Conflict between Divorced Parents: The Portuguese Version of the Acrimony Scale

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Abstract

Coparenting conflict is predictive of parents' and children's adjustment to divorce. An accurate assessment of postdivorce acrimonious coparenting relationships is critical for research, clinical, forensic, and public policy purposes. The Acrimony Scale (AS) is a measure commonly used to assess coparenting conflict. We translated and cross-culturally adapted the AS to the Portuguese context, testing its reliability and validity. Using a web-based survey, data were collected from a community and convenience sample of 196 unrelated divorced parents, assessing sociodemographic characteristics, coparenting conflict, and divorce adjustment. The study consisted of two phases: (1) forward-backward translation and cultural adaptation and (2) psychometric properties analyses: construct and criterion-related validity and internal consistency reliability. The 25-item AS was successfully translated and cross-culturally adapted to the Portuguese language. Principal component analyses (PCA) suggested a three-factor structure solution of 22-items, explaining 57.5% of the variance. Confirmatory factor analysis (CFA) showed the goodness of fit of this tridimensional model. The results also demonstrated acceptable convergent and good discriminant validity and high internal reliability. Scores on the AS suggested good known-groups validity and high discriminative power with 86.7% classification accuracy. The area under the ROC curve was 0.91, establishing a very good predictive value of the scale. We suggest that the AS is a reliable multidimensional measure to assess coparenting conflict after divorce and may be useful, namely, in the psychological assessment of child custody and evaluation of the effectiveness of coparenting conflict-based interventions. We discussed future research and practical implications.

Keywords Divorce · Coparenting conflict · Coparental acrimony · Psychometric properties

Highlights

- It is the first psychometric validation of the AS, including in the Portuguese context.
- Reliability and validity procedures provided evidence that the AS, with three factors and 22 items, is a valid and reliable measure of coparenting conflict.
- AS shows a high discriminative power between high and low conflictual divorced parents and is a strong predictor of divorce adjustment and positive divorce resolution.

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- This study is an important advancement in the research of coparenting conflict as acrimony has been found to be a salient predictor of parents' and children's postdivorce adjustment.
- The availability of cross-culturally appropriate and valid instruments is important in describing the state of the problem as well as in developing tailored interventions among highly conflictual divorced parents.

Divorce, Child Custody and Coparental Acrimony

Divorce or parental separation is an increasingly common experience for both adults and children and is one of the greatest and most difficult family transitions (Amato, 2010). In most industrialized societies, divorce rates are often in the 40–50% range (Center for Disease Control and Prevention, 2016, as cited in Hald et al., 2020). Portugal has one of the highest divorce rates among European countries. In 2020, Portuguese statistics registered a remarkable ratio of 91 divorces per 100 legal marriages, which is a significant increase compared to 30 divorces per 100 marriages in 2000 or to 60 divorces per 100 marriages in 2008, a year of global macroeconomic crisis (FFMS, 2021). The COVID-19 pandemic seems to have led to an unprecedented number of Portuguese divorce requests. The accumulation of pandemic-related stressors (e.g., pressures of remote work, the closing of schools and kindergartens, the mandatory social isolation) have fueled family problems and have led to a disruption of family life (Ahmed et al., 2020; Amato et al., 2011; Brodeur et al., 2020; Fallesen & Breen, 2016). Empirical evidence suggests that the compilation of other stressors than divorce (such as economic and social crisis factors) places family members at risk for a range of difficulties in individual and relational functioning (Greene et al., 2003; Lebow, 2019b; Lebow, 2020).

For people who divorce and have children, a custody agreement must be reached as part of the divorce process, thereby adding to emotional stress (Anderson, 2017). In Portugal, because of a legal presumption of joint custody (Decreto-lei n.º 47344/66), divorced parents must continue to exercise a conjoint coparenting relationship (i.e., sharing parental responsibilities in the case of important decisions regarding the child's life) based on the values of cooperation, support, sharing, and understanding and according to the principles of the child's best interests and gender equality in parenthood (Pereira & Pinto, 2015; Wall, 2015). However, shared physical custody of children is not often applied, and courts tend to consider mothers the primary caregivers and custodial guardians of children, which has continued to drive public debate on the issue of parental equality in postdivorce families (Wall, 2015).

Coparenting refers to how parents relate to one another in performing their parental roles, namely, the reciprocal and conjoint involvement of both parents in education, child-rearing, and planning of children's life decisions (Feinberg, 2003). There is ample variation in the quality of the

coparenting relationship following divorce: the majority of parents can negotiate child custody and respond positively to practical childrearing concerns without outside assistance (Saini & Birnbaum, 2015), but other parents manifest emotional and behavioral difficulties that tend to decline over time (two to three years after divorce, Johnston & Roseby, 1997). Some individuals transition from their spousal roles to their new roles as coparents (McIntosh et al., 2009), while others remain chronically conflictual after divorce (Drapeau et al., 2009), maybe as a way of emotionally contesting the end of a marriage (Sbarra & Emery, 2008). An estimated 5–25% of divorced parents report high levels of conflict (Coates et al., 2004; Neff & Cooper, 2004; Ottosen et al., 2017; Smyth and Moloney, 2017, as cited in Hald et al., 2020), which displays a crossfire of coparental acrimony or psychologically maintained hostility (Jacobs & Jaff, 2010). This type of no-good divorce is characterized by high conflict levels and occupies up to 90% of family court resources (Coates et al., 2004; Neff & Cooper, 2004; Smyth & Moloney, 2017). In Portugal, there are many high-conflict child custody disputes that involve court proceedings, overregulation, the modification of parental custody issues, and noncompliance with visitation schedules, alimony, and child-support payments, among other thorny issues. In 2020, there were 38.135 civil tutelary processes regarding parental responsibilities that entered Portuguese family courts of the first instance, which is 88% of all civil tutelary processes (Instituto Nacional de Estatística [INE], 2021). The culture of litigation and the adversarial context that surround the family law process heightens the complexities of dysfunctional family dynamics (Pruett et al., 2005).

More than the conceptualization of coparenting conflict, coparental acrimony implies the complex affective and attitudinal domains of the coparenting relationship. Therefore, as a core characteristic of high-conflict divorces, coparental acrimony has been increasingly recognized as a significant risk factor associated with parents' and children's adjustment to divorce (Amato, 2014; Demby, 2009; McIntosh et al., 2009). Following Johnston (1994, as cited in Langenbrunner et al., 2013), divorce conflict outlines the following three important dimensions that should be taken into account when assessing coparenting conflict: the domain dimension (e.g., the inability of the parents to resolve issues surrounding custody and the amount of access that each parent have to the children); the tactics dimension (i.e., how coparenting issues are managed); and the attitudinal dimension (i.e., the degree of emotional feelings or hostility that the parents have toward one another). Studies agree that high-conflict divorce and acrimonious

coparenting relationships tend to be characterized by entrenched conflict, high levels of distrust and anger between parents – even intermittent physical aggression and verbal abuse – low levels of cooperation about children’s care, frequent arguments or disagreements, an inability to think about their coparenting role as distinct from their intimate relationship with their former spouse, ongoing communication difficulties, inconsistent parenting, children used as arguing tools, sabotaging the children’s relationship with the other parent, and ultimately impoverished and strained parent-child relationships (Fidler & Bala, 2020). Different from general marital acrimony and coparenting problems in intact families, this form of conflict between divorced or separated parents represents a unique domain of interparental discord that is mainly focused on childrearing and child custody issues (Emery, 1994). The level of coparenting conflict rather than the general level of interparental conflict is most strongly associated with various adverse outcomes for both children and parents (Adamsons & Pasley, 2006). Postdivorce acrimonious coparenting conflict is associated with poorer child adjustment, particularly when it places the child in the middle by deprecating or badmouthing the other parent (Rowen & Emery, 2018), making the child carry negative messages between the parents, and creating loyalty conflicts for children (Buchanan et al., 1991). It can also threaten children’s well-being and emotional security by leading to a decrease in the quality of parenting by high-conflict custodial and noncustodial parents (i.e., a lack of responsiveness, harshness and instrumentalization; Goodman et al., 2004).

Postdivorce Coparenting Conflict and Coparental Acrimony Assessment

A key driver of prolonged high levels of coparenting conflict is the degree of acrimony, hostility, or negative affect between divorced parents (Demby 2009; Smyth & Moloney, 2017). Instruments that include both direct indicators (e.g., the level or frequency of coparenting conflict) and empirically identified indirect indicators, such as child-related content, intra- and interpersonal aspects of relationships (i.e., subjective feelings and evaluations about coparenting relationships), child involvement and triangulation, parent-child relationships, conflict dynamics, and a global assessment of one’s former spouse as a parent, are rare. Accurately assessing high-conflict divorce or highly acrimonious coparenting conflict is conceptually and empirically challenging but of high clinical, legal-forensic, and societal importance (Hald et al., 2020). High conflict divorces often have longer, more complex, and more expensive case management trajectories, particularly in public administration systems (Ottosen et al., 2017; as cited in Hald et al., 2020). The ability to assess postdivorce coparenting relationships is critically important, as these

relationships are expected to play a significant role in how a family adapts to divorce (Sigal et al., 2011).

Furthermore, because postdivorce coparenting conflict or coparental acrimony may uniquely predict child development and parents’ adjustment, it is important to have adequate tools to capture this phenomenon in divorced families. An in-depth understanding of postdivorce family functioning and identifying acrimonious coparenting relationships enables clinically forensic psychologists and forensic custody evaluators to assist courts in making appropriate recommendations for therapeutic or psychoeducational interventions (as early as possible in the divorce process). These recommendations help establish and maintain custodial and visitation plans that can prevent conflict escalation and improve or at least contain the damaging impact of interparental hostilities on a child’s development (Demby, 2009). Psychologists and researchers usually assess coparenting conflict by focusing on limited aspects of postdivorce coparenting conflict, adapting instruments initially designed to assess interparental conflict in marriage or intact families and inferring coparenting. Thus, there is a need for specific validated measures that target the core coparenting conflict dimensions previously identified in the divorce literature, such as attitudinal and psychological coparental acrimony. We believe that a scale that assesses divorce conflict should target content conflict (e.g., visitation), conflict dynamics (disagreements, discord, and communication difficulties), child triangulation, the self-perceived quality of coparenting and the divorce process (friendly vs. hostile), an assessment of the former spouse as a parent and the parent-child relationship quality and level of conflict. One of the most used instruments developed specifically for assessing postdivorce coparenting conflict or coparental acrimony that considers the parents’ perspectives is the Acrimony Scale (AS; Emery, 1982b). This scale has been found to yield scores of high item reliability or internal consistency. However, to the best of our knowledge, there have been no worldwide studies on the structural validity of the AS (only a recent study of the structural validity of a short version that consists of 8 items exists; see Rahimullah et al., 2020). Furthermore, there are no published validated measures in the Portuguese context that can effectively assess the levels of acrimonious coparenting and conflict post-relationship dissolution from the parent’s perspective. Therefore, to use this questionnaire and validate in Portugal, a process of cross-cultural adaptation and validation (psychometric properties and reliability) was required.

Method

Participants

The sample was collected by using the following inclusion criteria: (a) consent for and compliance with all aspects of

the study protocol; (b) having Portuguese nationality; (c) being 18 years old or older; (d) having experienced separation or divorce; and (e) having one or more children under 18 years in common with the person from whom they are separated. The participants are community members.

Measures

Family background questionnaire (FBQ)

The sociodemographic variables were assessed with the FBQ developed by the research team. The FBQ included (a) *demographic items* (e.g., parental role, sex, age, living zone, self-perceived socioeconomic level, educational level, and professional status), (b) *relational and divorce-related variables* (e.g., intimate relationship length, separation mode, time since separation, number and age of children, custody arrangements, and physical custody grant) and (c) *family- and conflict-related variables* (e.g., having coparenting conflict or not, self-perceived degree of coparenting conflict, legal conflict content, and duration of legal conflict).

Acrimony scale (AS; Emery, 1982b)

The AS is a 25-item measure of coparenting conflict or coparental acrimony between separated or divorced parents. The items address common problems in coparenting conflict that arise between separated or divorced parents, such as custody arrangements (e.g., “*Is the parenting schedule a problem between you and your former spouse?*”), financial support (e.g., “*Are support payments a problem between you and your former spouse?*”), and general conflict (e.g., “*Do you have any angry disagreements with your former spouse?*”). The items are rated on a Likert scale from 1 (almost never) to 4 (almost always). Positively worded items were reversed, and responses were summed to produce a single acrimony score, with higher scores indicating more acrimony (*referred to as parent-reported coparenting conflict*). Higher scores indicate more conflict and more coparenting difficulties. The AS has been found to have high internal consistency ($\alpha = 0.86$) and test-retest reliability ($\alpha = 0.88$ over six weeks) (Emery, 1982b) and has also been widely utilized in other research that specifically involves postseparation populations (e.g., Anderson, 2017; Jacobs & Jaffe, 2010; Rowen & Emery, 2018; Shaw & Emery, 1987).

Divorce adjustment inventory-revised (DAI-R; Portes et al., 2000)

The DAI-R is a 42-item parent-report instrument designed to assess both children’s adjustment and family functioning

during parental divorce. The following five factors are assessed on the DAI-R: (1) Family Conflict and Dysfunction (i.e., pathological family functioning); (2) Favorable Divorce Conditions and Child Coping Ability (i.e., protective family conditions); (3) Positive Divorce Resolution (i.e., the positive parental relationship before and after the divorce); (4) External Support Systems (i.e., access to support system); and (5) Divorce Transition (i.e., family instability and inconsistency). The ratings are given on a 5-point Likert scale that ranges from 1 (strongly disagree) to 5 (strongly agree). Preliminary analyses demonstrated good internal consistency (ranging from 0.69 for the total scale score) (Portes et al., 2000). In the Portuguese validation study, the Cronbach’s alpha for the subscales ranged between 0.65 and 0.84 (Lamela et al., 2009). In the present sample, coefficient α was 0.87 for the overall measure and ranged between 0.64 and 0.89 for the subscales.

Procedures

We used a cross-sectional survey design and a convenience community-based sample. Data were collected between March and October 2018 through an online assessment protocol, which was constructed through the software Survey Creator. This study was authorized by the institutional ethics committee and was conducted in accordance with the Helsinki Declaration (1964). Data were collected following the Ethics Guidelines for Internet Mediated Research (British Psychological Society, 2003). The study dissemination was conducted through electronic outreach – e-mails to institutional universities and specialized attendance services web accounts – notices on national web forums, such as a support group forum to divorced adults and a family issues forum, and announcements in social networks. An invitation for participation in this study was distributed through an e-mail that contained a brief explanation of the study and the survey link. The assessment protocol included information about the study’s aims, the inclusion criteria, the procedures, the voluntary nature of participation, compliance with confidentiality and anonymity (American Psychological Association [APA], 2010), and the identification and contacts of the research team. All participants completed the assessment protocol after agreeing with the informed consent, and no monetary or other compensation was given to the participants.

Translation and Back-translation of the AS with Cultural Adaptation

The AS (Emery, 1982b) was chosen based on five considerations: (a) following a systematic in-depth literature search on the specific instruments used to assess post-divorce coparenting conflict; (b) the theory-driven method

used to construct the AS and determine its content validity; (c) the wide range of aspects of coparenting conflict that the AS covers; (d) the widespread use of the AS regarding child custody issues in research, clinical-forensic and public policy contexts; and (e) the good reliability indicators of the AS across studies. The AS presented several advantages over other measures of parental conflict, including a specific focus on conflict concerning childrearing and child custody issues, good psychometric properties (reliability and test-retest) and brevity. After choosing the measurement instrument, permission was requested from the author to translate, cross-adapt, and validate the scale for a sample of Portuguese divorced parents. This authorization was granted in July 2017.

Analytic Plan

First Stage: Translation and Transcultural Adaptation of the AS

The International Test Commission Guidelines for Translating and Adapting Tests (International Test Commission, 2017) and a qualitative approach were followed to ensure the construct equivalence of the AS across linguistic contexts (i.e., to ensure that the construct measured by the AS in the cultural source or linguistic group is comparable to the construct measured by the same instrument in other targeted cultural or linguistic group, such as the Portuguese context). In this process, content validity is an essential component because it shows that the items of the intended instrument accurately measure the intended concept, as face validity refers to the comprehensibility of the items for the target population. First, two forward translations of the original AS version were produced by two bilingual independent researchers whose native language was the target language and whose source language was their second language (both with an academic degree in Applied Psychology and extensive experience in coparenting conflict assessment and intervention). The obtained translations were reconciled by a third translation to achieve a first preliminary version. Second, this consensus version was back translated to English by another independent researcher proficient in the source language without prior knowledge of the original version. The back-translation was reconciled by a third translation to achieve a second preliminary version. Subsequently, the reconciled versions were analyzed by a review committee (seven experts with PhD. and Master's degrees in psychology and with research, professional and/or teaching experience in psychology and instrument validation) requested to comment on the comprehensibility, grammar, wording, scoring, adequacy, clarity, and simplicity of the AS items. Then, the

items were revised based on their comments to achieve a third preliminary version. This version was submitted to a face validity test through a pilot study with ten participants to verify the comprehensibility and adequacy of the instructions, items, and response format of the scale. These participants were not included in the final sample.

Second Stage: Assessment of the Psychometric Properties of the AS

In the psychometric study, the statistical analysis comprised several steps that involved: (i) a descriptive and sensitivity analysis of the data, (ii) factor structure analyses (i.e., the degree to which the hypothesized structure of a measurement scale is observed in a dataset of responses to survey items), and (iii) validity tests (i.e., the extent to which a test accurately measures what it is supposed to measure). This study analyzed various mandatory types of validity tests, namely, construct validity, criterion-related validity, and reliability.

Sensitivity and Reliability Analysis

Measures of the central tendency and shape were used to assess the psychometric sensitivity of each item. Items with absolute values of $Sk > 3$ and $Ku > 7$ were considered to have sensitivity problems (Kline, 2011). The internal consistency reliability was examined by computing Cronbach's alpha coefficients, mean interitem correlations and corrected item-total correlation ranges. Internal consistency values from 0.70 to 0.80 are considered to be acceptable, and those from 0.80 to 0.90 are considered to be very good (DeVellis, 2012). The values of the mean inter-item correlations within the 0.15–0.50 range are considered to be good, and corrected item-total correlation ranges above 0.20 are considered to be acceptable (values $r > 0.20$ and ≥ 0.30 indicate moderate discrimination and good discrimination, respectively) (Nunnally & Bernstein, 1994). The statistical analyses were performed by using Statistical Package for the Social Sciences (SPSS) version 26.0 (IBM, SPSS, Chicago, IL).

Construct Validity: Exploratory and Confirmatory Factorial Analyses

Before the exploratory factor analyses (EFA), the suitability of the data for factor analysis was assessed by considering the sample size and the strength of the relationship among the items. Reflecting on the guidelines of Tinsley and Tinsley (1987), in this study, we established a ratio between 5 and 10 participants per item as sufficient and acceptable for EFA. The original author (Emery, 1982b) suggested that the AS is a unidimensional scale on the theory-driven method because the factorial analyses were unsuccessful. The difficulty in finding a reliable factor structure for a

measure and in obtaining a stable factor structure may reflect, from our perspective, the complex nature of the measured construct.

To our knowledge, the AS has not yet been validated through a factor analysis in any population before this study. Thus, we began to perform an EFA with the principal component analysis (PCA) method of parameter estimation, with orthogonal varimax rotation, to identify the smallest number of factors that can be used to describe the underlying interrelationships among the variables. We considered Kaiser-Meyer-Olkin (KMO) values higher than 0.70 and Bartlett's test of sphericity ($p < 0.001$) to determine the adequacy of the PCA. The number of factors to retain was indicated by eigenvalues > 1 and a factor loading > 0.30 (Stevens, 2002). Item loadings lower than the threshold of 0.30 in the theorized factor were removed. Community coefficients ($h^2 \geq 0.40$) were also taken into account as these can be seen as indicators for the quality of the measurement. The factorial structure should explain a minimum of 50% of the model variance (Field, 2005; Marôco, 2010a).

Next, a CFA was conducted with Analyses of Moments Structures (AMOS 26.0; IBM, SPSS, Chicago, IL) through structural equation modeling (SEM) with the maximum likelihood estimation method for the AS items and three subscales. To test the goodness of fit of the overall model, we considered acceptable chi-square (χ^2/df) values lower than 3 (a value ≤ 2 is considered to be good, and a value of 1 is considered to be very good; Brown & Moore, 2012; Marôco, 2014a). Because the chi-squared test of absolute model fit is sensitive to the sample size and is affected by the distribution of the variables, we also turned to other fit statistics, such as comparative fit index (CFI), Tucker-Lewis index (TLI) and incremental fit index (IFI) values higher than 0.90 and root mean square error of approximation (RMSEA) values lower than 0.06 (< 0.07 is acceptable) (Marôco, 2010a). The CFA was performed on the ordinal items, and standardized loadings above 0.30 were considered. Modification indices were considered to check if any suggestion of model modification would significantly improve the measurement model.

Convergent Validity

Convergent validity occurs when the items that are reflections of a factor are heavily saturated on this factor. In this study, convergent validity was estimated by the average variance extracted (AVE) and the composite reliability (CR; Fornell & Larcker, 1981; Marôco, 2010a) at the total and subscale levels. The AVE provides the summary of the overall convergence of a scale and reflects the average commonality (Fornell & Larcker, 1981), i.e., the variance captured by an instrument through all its items. CR indicates the internal consistency of the instrument. The

recommended thresholds for these measures are that the AVE should be ≥ 0.50 and $CR \geq 0.70$, according to the proposal by Hair et al. (2014). The AVE and CR values were computed with Microsoft Excel (Gaskin, 2016).

Discriminant Validity

Discriminant validity aims to ensure that a reflective construct has the strongest relationships with its indicators (Hair et al., 2017). For this purpose, we intended to evaluate the extent of the cross-loadings among the constructs in the model by using the heterotrait-monotrait ratio of correlation (HTMT; Henseler et al., 2015). The HTMT method can achieve higher specificity and sensitivity rates (97 to 99%) than the traditional Fornell-Larcker criterion (20.8%) (Henseler et al., 2015). HTMT was used in two ways, namely, (1) as a criterion and (2) as a statistical test. As a criterion, we calculated HTMT through a multitrait-multimethod matrix among the AS factors by using a value lower than 0.85 to indicate adequate discriminant validity (Henseler et al., 2015). An HTMT ratio analysis permits a systematic discriminant validity assessment to establish construct validity in variance-based SEMs (Henseler et al., 2015). As a statistical test, we used the bootstrapping procedure to estimate HTMT inference. When the confidence interval of the HTMT inference values for the structural paths is < 1 , this indicates a lack of discriminant validity. If the value of 1 falls outside the interval's range, then this suggests that the construct is empirically distinct. The HTMT values were computed with Microsoft Excel (Gaskin, 2016).

Predictive Criterion Validity: Known-groups Approach and Discriminant Function Analysis (DFA)

This evidence refers to the self-reported postdivorce conflictual condition (yes = 1, no = 0) defined by participant responses in the sociodemographic questionnaire. The participants were divided into two groups, specifically, conflictual ($n = 128$) and nonconflictual ($n = 68$) divorced parents. The known-groups approach was considered because the compared groups were distinct (i.e., conflictual and nonconflictual) in relation to the same construct measured (i.e., coparental acrimony). We hypothesized that the coparental acrimony scores would be higher among the participants who self-reported being involved in a conflictual condition compared to the participants in the nonconflictual condition. Known-group validity was determined by performing between-group analyses through a parametric independent t test for the total AS and subscales. P values of less than 0.05 were considered significant in the analyses. Additionally, we tested a direct DFA (enter method) to determine the ability of the entire scale and its three factors to discriminate between conflictual and nonconflictual divorced parents (grouping variables) and predict

group membership. DFA (Fisher, 1936) is a powerful descriptive and classificatory method used to (a) describe characteristics that are specific to distinct groups and (b) classify cases (that are individuals, subjects, and participants) into pre-existing groups based on similarities between this case and the other cases that belong to the groups.

ROC Curves Analysis and the Optimal Cutoff Point

To establish the validity of the AS as a screening tool, receiver operating characteristic (ROC; Swets, 1979) curve was used to identify and determine the cutoff scores for performance that correspond to various diagnostic accuracy levels. The ROC procedure graphically plots the true positive rate (i.e., sensitivity) and false-positive rate (1-specificity) as a function of all possible cutoff scores on the predictor. The technique can thus be used to identify a cutoff point that jointly maximizes sensitivity and specificity. The area under the curve (AUC) of the cutoff point is the measure of overall accuracy and the probability that the predictor will distinguish the presence or absence of a condition or detect corresponding symptoms, with values closer to the upper bound of 1.0 indicating larger effects and perfect accuracy (Fletcher & Fletcher, 2005). AUC values of ≥ 0.90 are considered to be excellent, 0.80–0.90 are good, 0.70–0.80 are fair, and < 0.70 are poor (Carter et al., 2016). There is no standard way to determine the optimal cutoff point. In this study, for this purpose, Youden's J index – the smallest sum of the classification error rates – was calculated from the sum of sensitivity and specificity minus one (i.e., $J = \text{sensitivity} + \text{specificity} - 1$) (Böhning et al., 2008). The Youden Index detects the maximum thresholds of both sensitivity (i.e., the proportion of subjects who have the target condition and exhibit positive test results) and specificity (i.e., the proportion of subjects without the target condition and exhibit negative test results). We performed an ROC analysis and Youden's indices by using data gathered from the conflictual divorced parents' subsample ($n = 128$). We considered sensitivity, specificity, and the Youden Index to determine the cutoff scores for low and moderate to high coparental acrimony. SPSS for Windows, version 26 (IBM, SPSS, Chicago, IL) was used to (i) generate the sensitivity and specificity values for the AS, (ii) plot an ROC curve and (iii) calculate the area under the resultant curve, according to the nonparametric method. Youden's indices were computed with Microsoft Excel (Gaskin, 2016).

Hierarchical Linear Regression

We also used hierarchical multiple regression (HMR) models to test the predictive capacity of the AS, i.e., if the AS (variable of interest) is associated with the relevant variables

referred to in the literature such as parents' divorce adjustment (DAI-R all measure) and positive divorce resolution (DAI-R subscales) (i.e., a positive parental relationship, healthy adjustment to the divorce on the parts of both parent and child, satisfaction with the ex-spouse meeting custody responsibilities, behavioral and emotional agreement on household decisions, discussions of feelings and problems with one another and doing things together) while controlling for some demographic, relational and family variables. This was examined by applying a two-step hierarchical regression and another method that consisted of a first step that contained the control variables (parental role/sex, age, socioeconomic level, educational level, intimate relationship length, time since separation, separation mode, joint legal custody, shared joint physical custody and previous conflict) and a second step that included the AS total score. The socioeconomic level (low = 1, all others = 0), educational degree (1–4 years = 1, all others = 0), joint legal custody (yes = 1, no = 0) and joint physical custody (yes = 1, no = 0) were all dummy coded. Separate models were computed for divorce adjustment and positive divorce resolution. The standardized regression coefficients (β), R^2 change and its corresponding change in the F (ΔF) and p values are the statistics of greatest interest concerning the extent and strength of the explanatory (predictive) power of the AS. An explanatory power greater than or equal to 25% ($R^2 \geq 0.25$) was considered to indicate sufficient predictive validity.

Results

Characteristics of the Participants

A total of 306 participants responded to the study, but only 196 provided valid responses (64.1%). All 196 participants were unrelated separated or divorced parents of whom 130 (66.3%) were mothers and 66 (33.7%) were fathers, and they ranged from 28 to 65 years of age ($M = 42.54$ years, $SD = 7.20$). The majority of the sample had more than 12 years of education ($n = 141$, 71.9% had bachelor's, master's or doctoral degrees), were employed at the time of the assessment ($n = 180$, 91.8%) and came from a medium socioeconomic background ($n = 89$, 45.4%). The participants had an intimate relationship with their former spouse for an average of 10.71 years ($SD = 6.80$ years; variable between 1–31 years) and had between 1 and 4 children together, who ranged between 1 and 17 years old. Their separation had occurred on average 4.8 years earlier ($SD = 3.80$) and in 38.3% of cases ($n = 75$), was nonconsensual or contentious. The majority of the sample met the coparenting conflict condition ($n = 128$, 65.3%), with 90 participants (70.3%) presenting legal disputes on key issues related to child custody, mainly visitation ($n = 56$, 43.8%) and alimony ($n = 46$,

35.9%). Approximately 53.1% ($n = 68$) of the cases fell within the scope of a high conflict level. The physical custody of the majority of children (75.7%) was granted to the mother. The sociodemographic, relational and family data of the entire sample and across the subsamples (conflictual and nonconflictual divorced parents) are shown in Table 1. Sociodemographically, the two groups were equivalent, except in the parental role/sex, residential zone, and separation mode. There were significant differences between the means in these variables of the two groups, which reflects the unequal number and distribution of mothers and fathers in each group, with a clearly higher percentage of mothers than fathers in the nonconflictual group.

Translation and Cultural Adaptation of the AS

The multistep adaptation process did not reveal significant problems or inaccuracies, and the scale's equivalence to the original was confirmed following committee review (content validity). The parents involved in the piloting of the preliminary version of the AS did not identify any difficulties. All the questions and response options were considered to be satisfactorily understandable by the subjects, which confirms the face validity of the scale. Therefore, in the qualitative face and content validity assessment, none of the items were changed and were thus used in the validation study.

Assessment of the Psychometric Properties of the AS

Descriptive and item analyses

There were no missing data for any individual item of the AS or for the other measures used. The means, standard deviations, interquartile ranges, skewness, kurtosis and corrected item-to-total scale correlations for the entire sample are presented in Table 2. The item means vary between 1.30 (Item 24) and 3.32 (Item 5) on a 4-point rating scale. The skewness statistic was -0.03 for the total score and ranged from -0.08 to 2.46 for the items. The kurtosis statistic was -0.95 for the total score and ranged from -0.32 to 6.25 for the items. Except for one item (item 24), the skewness and kurtosis values of all items and the total score were below the thresholds of 3 and 7, respectively, which suggests that normality was not violated. The item-total correlation values ranged from 0.19 (low) to 0.77 (high), with Item 8 (“*Do your children see your former spouse as often as he or she would like?*”), Item 24 (“*Have you adjusted to being divorced/separated from your former spouse?*”) and Item 25 (“*Has your former spouse adjusted to being divorced from you?*”) having nonacceptable correlation coefficient values (<0.20), which did not contribute

sufficiently to discriminate between divorced parents. To maximize the psychometric sensitivity of the scale, these items were excluded from subsequent analyses.

Construct Validity

Exploratory factor analysis (EFA)

Considering the parameters to be estimated in the original model ($q = 25$), the sample size used in the factorial analyses ($N = 196$) reasonably represented a sample-size-to-parameters ratio of 8:1 ($N:q$), which fulfills the minimum subject-to-item ratio of at least 5:1, as suggested by some authors (e.g., Kline, 2011). All commonalities were higher than the threshold of 0.40, which confirms that each item shares some common variance with the other items. The conceptual structure of the Portuguese version of the AS was achieved by performing a PCA with the remaining 22 items of the AS, without a previous definition of the number of factors, by using varimax rotation and an eigenvalue ≥ 1 . $KMO = 0.90$ ($KMO \geq 0.60$), and $TEB = 2801.42$; $p < 0.001$ indicates the suitability of the data for EFA. A preliminary PCA was undertaken by using a criterion of greater than or equal to 0.30 as the level of loading significance, with the results suggesting a three-factor solution, in disagreement with the suggested unidimensional original model. Together, the three factors explain 57.5% of the total variance found in this study. After rotation, the first factor (labeled “*coparenting conflict issues and child involvement*”) contained loadings for 11 items (3, 4, 10, 11, 12, 13, 15, 16, 17, 22, and 23) and justified 40.25% of the overall variance found. The second factor (labeled “*unfriendly and unsupportive coparenting relationship*”) contained loadings for seven items of the instrument (1, 5, 9, 18, 19, 20, and 21) and contributed 10.60% of the total explained variance. Finally, the third factor (labeled “*child-parent relationship impact*”) was composed of four items (2, 6, 7, and 14) and accounted for 6.68% of the total explained variance. All the items revealed factorial weights above 0.30, as shown in Table 3.

Confirmatory factor analysis (CFA)

The original model (Model 1: 1 factor and 25 items) presented weak adjustment quality indices since the values deviated from the reference ranges ($\chi^2 = 1148.02$, $p < 0.001$, $\chi^2/df = 4.17$, $RMSEA = 0.13$; $IFI = 0.67$, $TLI = 0.64$, $CFI = 0.67$). Additionally, the unidimensional model with the remaining 22 items (Model 2: 1 factor and 22 items) demonstrated poor adjustment quality indices ($\chi^2 = 952.91$, $p < 0.001$, $\chi^2/df = 4.54$, $RMSEA = 0.14$; $IFI = 0.70$, $TLI = 0.67$, $CFI = 0.70$). None of the considered suggestions of model modification significantly improved the two measurement models.

Table 1 Sociodemographic characteristics of the overall sample and conflictual and nonconflictual subsamples

Variables	Total sample (<i>N</i> = 196) (%)	CG (<i>n</i> = 128) (%)	NCG (<i>n</i> = 68) (%)	χ^2 / t	<i>d</i> /φ/ Cramer's V
Parental role/Sex				19.18***	0.31
Mothers/Feminine	127 (66.3)	69 (53.9)	58 (85.3)		
Fathers/Masculine	69 (33.7)	59 (46.1)	10 (14.7)		
Age (years)				-1.37	0.21
Mean (SD), range	42.54 ± 7.20, 28–65	43.05 ± 7.46, 28–65	41.57 ± 6.63, 29–55		
Residential zone				29.12*	0.39
North	91 (46.4)	59 (46.1)	32 (47)		
Center	65 (33.1)	37 (29)	28 (41.2)		
Lisbon	27 (13.8)	21 (16.5)	6 (8.8)		
Alentejo	4 (2)	4 (3)	–		
Algarve	1 (0.5)	1 (0.8)	–		
Azores	5 (2.6)	3 (2.3)	2 (2.9)		
Madeira	3 (1.5)	3 (2.3)	–		
Socioeconomic level				8.51	0.21
Low	16 (8.2)	14 (10.5)	2 (2.9)		
Medium low	61 (31.1)	40 (31.3)	21 (30.9)		
Medium	89 (45.4)	51 (39.8)	38 (55.9)		
Medium high	27 (13.8)	20 (15.6)	7 (10.3)		
High	3 (1.5)	3 (2.3)	–		
Education level (years)				1.61	0.09
5–6	3 (1.5)	2 (1.6)	1 (1.5)		
7–9	4 (2)	3 (2.3)	1 (1.5)		
10–12	48 (24.5)	32 (25)	16 (23.5)		
>12	141 (71.9)	91 (71.1)	50 (73.5)		
Professional status				3.56	0.14
Student	1 (0.5)	–	1 (1.5)		
Employed	180 (91.8)	116 (90.2)	64 (94.1)		
Unemployed	14 (7.1)	11 (8.6)	3 (4.4)		
Retired	1 (0.5)	1 (0.8)	–		
Intimate Relationship length with the ex (months)				-2.25	0.04
Mean (SD), range	128.71 ± 81.33, 12–372	129.78 ± 84.76, 12–372	126.69 ± 75.05, 12–300		
Separation mode				34.49***	0.42
Consensual	121 (61.7)	60 (46.9)	61 (89.7)		
Litigious	75 (38.3)	68 (53.1)	7 (10.3)		
Time since separation (months)				0.48	0.07
Mean (SD), range	57.17 ± 45.59, 1–240	56.04 ± 48.21, 1–240	59.29 ± 40.45, 1–160		
Number of children				0.64	0.09
Mean (SD), range	1.47 ± 0.64, 1–4	1.45 ± 0.61, 1–4	1.51 ± 0.70, 1–4		
Age of children (years)				0.44	0.25
Mean (SD), range	9.98 ± 4.30, 1–17	10.89 ± 3.40, 1–17	9.85 ± 4.90, 1–17		
Custody arrangement				1.68	0.09
Joint legal custody	139 (70.9)	95 (74.2)	46 (67.6)		
Shared physical custody	35 (17.9)	25 (19.6)	12 (17.6)		
Sole custody	20 (10.2)	10 (7.8)	10 (14.7)		

Table 1 (continued)

Variables	Total sample (<i>N</i> = 196) (%)	CG (<i>n</i> = 128) (%)	NCG (<i>n</i> = 68) (%)	χ^2/t	<i>d</i> /φ/ Cramer's V
Physical custody grant				-0.07	0.13
Mother	218 (75.7)	137 (74.5)	81 (77.9)		
Father	14 (4.9)	13 (7.1)	1 (1)		
Both	56 (19.4)	34 (18.5)	22 (21.2)		
Previous conflict				1.21	0.08
Yes	117 (59.7)	80 (62.5)	37 (54.4)		
No	79 (40.3)	48 (37.5)	31 (45.6)		
Remarriage				3.33	0.13
Yes	79 (40.3)	46 (35.9)	33 (48.5)		
No	116 (59.2)	81 (63.3)	35 (51.5)		
Legal conflict					
Yes		90 (70.3)	–		
No		38 (29.7)	68 (100)		
Level of conflict					
Low		38 (29.7)			
Moderate		22 (17.2)			
High		68 (53.1)			
Legal conflict content					
Physical custody		33 (28.5)			
Legal custody		35 (27.3)			
Visitation		56 (43.8)			
Alimony		46 (35.9)			
Other		14 (10.9)			
Duration of conflict (months)		55.07 ± 44.31, 1–180			

Note. CG Conflictual Group, NCG NonConflictual Group; * $p < 0.05$; *** $p < 0.001$

To achieve an adequate goodness of fit of the Portuguese version of the AS, a model based on the results of the EFA, with three large factors, was tested (Model 3: 3 factors and 22 items). This CFA for Model 3 has better adjustment scores, although they can still be considered tolerable ($\chi^2 = 611.31$, $p < 0.001$, $\chi^2/df = 2.97$, RMSEA = 0.10; IFI = 0.84, TLI = 0.82, CFI = 0.84). To improve the model, modification indices were examined to determine whether additional paths could be added to the model. As a result, from the modification indices check, it was seen that adding a correlation between the error terms of Items 1–5, 11–17, 4–12, 17–10, 9–22, 15–23, 19–21 and 14–20 would increase the model fit. After the addition of these correlation terms, the results showed a good model fit. Specifically, the following tests of significance and fit measures were obtained: $\chi^2/df = 2.07$; RMSEA = 0.05, 90% CI [0.05, 0.06]; CFI = 0.92; TLI = 0.91; and IFI = 0.92. The CFI, TLI and IFI presented values greater than 0.90, which shows a good model fit. Additionally, an RMSEA smaller than 0.06 provides a good measure of the closeness of fit between the model and the data. Therefore, the model can be considered to be adequate and

valid. In Table 4, we analyze the differences regarding the goodness of fit among Model 1 (1 factor and 25 items), Model 2 (1 factor and 22 items) and Model 3 (3 factors and 22 items).

Internal consistency reliability and intercorrelations

The subscales showed very good and strong internal consistency ($0.82 < \alpha < 0.91$), and the overall scale had a Cronbach's alpha of 0.93. Bivariate Pearson correlations revealed that the three subscales were positively correlated with the AS (total scale) and between them (see Table 5). As expected, all correlations were positive statistically significant and exhibited a moderate to large effect size.

Construct Validity

Convergent validity

The AVE values for the three latent factors ranged from 0.39 to 0.52. The CR values ranged from 0.87 to 0.94 (see Table 6). The AVE values were equal to or above 0.50

Table 2 Descriptive and item analyses of the AS ($N = 196$)

Total score/items	<i>M</i>	<i>SD</i>	<i>IQR</i>	Skewness	Kurtosis	<i>CITC</i>	α if excluded
Total score	54.76	16.01	24.75	-0.03	-0.95	-	-
1. Do you feel friendly toward your former spouse?	3.24	1.07	1.00	-1.08	-0.32	0.74	0.91
2. Do your children feel friendly toward your former spouse?	1.65	0.92	1.00	1.26	0.50	0.50	0.92
3. Are gifts to the children a problem between you and your former spouse?	1.56	0.91	1.00	1.60	1.51	0.57	0.91
4. Is visitation a problem between you and your former spouse?	2.18	1.25	3.00	0.47	-1.45	0.71	0.91
5. Do you have friendly talks with your former spouse?	3.32	1.03	1.00	-1.33	0.41	0.69	0.91
6. Is your former spouse a good parent?	2.39	1.02	2.00	0.03	-1.15	0.61	0.91
7. Do your children see your former spouse as often as you would like?	2.18	1.22	2.00	0.17	-1.44	0.31	0.92
8. Do your children see your former spouse as often as he or she would like?	1.85	1.12	2.00	0.96	-0.59	0.19	0.92
9. Do you and your former spouse agree on discipline for the children?	2.72	1.08	2.00	-0.31	-1.18	0.71	0.91
10. Are your children harder to handle after a visit with your former spouse?	2.25	1.14	2.00	0.41	-1.25	0.59	0.91
11. Do you and your former spouse disagree in front of the children?	1.66	0.92	1.00	1.22	0.40	0.61	0.91
12. Do the children take sides in disagreements between you and your former spouse?	1.48	0.86	1.00	1.81	2.30	0.55	0.91
13. Are alimony or child support payments a problem between you and your former spouse?	2.32	1.28	3.00	0.32	-1.60	0.48	0.92
14. Do your children feel hostile toward your former spouse?	1.62	0.94	1.00	1.43	0.94	0.46	0.92
15. Does your former spouse say things about you to the children that you don't want them to hear?	2.42	1.24	3.00	0.14	-1.61	0.77	0.91
16. Do you say things about your former spouse to the children that he or she wouldn't want them to hear?	1.32	0.56	1.00	2.12	6.25	0.29	0.92
17. Do you have angry disagreements with your former spouse?	2.12	1.18	2.00	0.56	-1.22	0.65	0.91
18. Do you feel hostile toward your former spouse?	2.32	1.15	3.00	0.34	-1.32	0.52	0.92
19. Does your former spouse feel hostile toward you?	2.60	1.28	3.00	-0.08	-1.69	0.69	0.91
20. Can you talk to your former spouse about problems with the children?	2.85	1.26	3.00	-0.51	-1.44	0.75	0.91
21. Do you have a friendly divorce or separation?	2.85	1.29	3.00	-0.50	-1.52	0.69	0.91
22. Are pick-ups and drop-offs of the children between you and your former spouse a difficult time?	2.21	1.27	3.00	-0.44	-1.51	0.61	0.91
23. Does your spouse encourage your child to live with him or her?	2.26	1.33	3.00	0.32	-1.69	0.47	0.92
24. Have you adjusted to being divorced/separated from your former spouse?	1.30	0.68	0.00	2.46	5.74	-0.20	0.92
25. Has your former spouse adjusted to being divorced from you?	2.09	1.17	2.00	0.45	-1.38	0.20	0.92

M mean, *SD* standard deviation, *IQR* interquartile range, *CITC* corrected item total correlations

(good acceptance level), except for Factor 1, and the CR values were all above 0.60 (Fornell & Larcker, 1981). When the AVE values are less than 0.40 for any factor and the composite reliability is higher than 0.60, the convergent validity of the construct may still be adequate (Fornell & Larcker, 1981). Malhotra and Dash (2011) also argued that the AVE is often too strict, and validity can be established through CR alone. All constructs exhibited CR with the minimum acceptable level of 0.60, which indicates excellent reliability.

Discriminant Validity

Fornell-Larcker criterion and HTMT

The HTMT ratios (the bolt off-diagonal of Table 7) between each of the three factors in the AS were lower than the

maximum threshold of 0.85, which provides evidence of discriminant validity within the AS. Furthermore, the results show that neither the lower nor upper confidence interval (CI) includes a value of 1. Thus, the discriminant validity of the measure was established by both HTMT and HTMT inference. These results indicate that all constructs have adequate discriminant validity levels.

Predictive Criterion Validity

Known-groups validity and DFA

Table 8 shows the means and standard deviations for conflictual and nonconflictual divorced parents. There were significant differences between the groups on the total scale and all subscales of the AS. Independent group t-tests showed that conflictual divorced parents scored

Table 3 Principal component analysis of the AS ($N = 196$)

Items	Factor loadings λ			Comm. h^2	MIC	CITC r
	Factor 1	Factor 2	Factor 3			
<i>Coparenting conflict issues and child involvement</i>					0.40	
3. Are gifts to the children a problem between you and your former spouse?	0.65			0.52		0.57
4. Is visitation a problem between you and your former spouse?	0.73			0.68		0.71
10. Are your children harder to handle after a visit with your former spouse?	0.47			0.44		0.59
11. Do you and your former spouse disagree in front of the children?	0.83			0.70		0.61
12. Do the children take sides in disagreements between you and your former spouse?	0.66			0.58		0.55
13. Are alimony or child support payments a problem between you and your former spouse?	0.38			0.39		0.48
15. Does your former spouse say things about you to the children that you don't want them to hear?	0.66			0.72		0.77
16. Do you say things about your former spouse to the children that s/he wouldn't want them to hear?	0.37			0.81		0.29
17. Do you have angry disagreements with your former spouse?	0.69			0.63		0.65
22. Are pick-ups and drop-offs of the children between you and your former spouse a difficult time?	0.66			0.53		0.61
23. Does your spouse encourage your child to live with him or her?	0.58			0.60		0.47
<i>Unfriendly and unsupportive coparenting relationship</i>					0.59	
1. Do you feel friendly toward your former spouse?		0.79		0.79		0.74
5. Do you have friendly talks with your former spouse?		0.79		0.78		0.69
9. Do you and your former spouse agree on discipline for the children?		0.49		0.60		0.71
18. Do you feel hostile toward your former spouse?		0.67		0.54		0.52
19. Does your former spouse feel hostile toward you?		0.72		0.73		0.69
20. Can you talk to your former spouse about problems with the children?		0.77		0.77		0.75
21. Do you have a		0.70		0.69		0.69
<i>Child-parent relationship impact</i>					0.52	
2. Do your children feel friendly toward your former spouse?			0.70	0.62		0.50
6. Is your former spouse a good parent?			0.69	0.75		0.61
7. Do your children see your former spouse as often as you would like?			0.83	0.69		0.31
14. Do your children feel hostile toward your former spouse?			0.65	0.60		0.46
Reliability	0.88	0.91	0.81			
Total	40.3%	10.6%	0.93			
Explained variance			6.7%			
Total			57.5%			

Comm. commonalities, MIC mean item correlation, CITC corrected item-total correlation

significantly higher than nonconflictual divorced parents on the AS total ($t(136.76) = -12.75, p < 0.001$), subscale 1 ($t(194) = -10.48, p < 0.001$), subscale 2 ($t(194) = -14.81, p < 0.001$) and subscale 3 ($t(150) = -3.58, p < 0.001$).

All underlying assumptions, including the absence of outliers (Mahalanobis distance - D^2), the absence of missing data, linearity, normality, and the absence of multicollinearity (tolerance values < 0.10 and variance inflation factor values > 10.0), were met. The results of Box's M were statistically significant ($p < 0.001$). This signifies that the covariance matrices were significantly different, which indicates that the assumption of

homogeneity was violated (Field, 2005). However, this test is sensitive to unequal groups. Tabachnick and Fidell (2007) indicated that a "violation may not invalidate the results, but the finding should be noted" (p. 85). DFA that used the enter method revealed significant differences between the groups in the independent variables, and these variables had significantly loaded on one function, which correctly classified 86.7% of the sample, Wilk's $\lambda = 0.45, X^2(3) = 154.10, p < 0.001$. The effect size as measured by the canonical correlation was 0.74. The standardized canonical discriminant function coefficients for the resulting equation are presented in Table 9.

Table 4 Model fit statistics for the confirmatory factor analyses of the AS ($N = 196$)

Model	χ^2 (df)	χ^2/df	IFI	TLI	CFI	RMSEA
1. Acrimony Scale: one factor (25 items)	1148.02 (275)***	4.17	0.67	0.64	0.67	0.13
2. Acrimony Scale: one factor (22 items)	952.91 (210)***	4.54	0.70	0.67	0.70	0.14
3. Acrimony Scale: three factors (22 items)	396.68 (192)***	2.07	0.92	0.91	0.92	0.05
	–	<3	>0.90	>0.90	>0.90	<0.06

IFI incremental fit index, TLI Tucker-Lewis index, CFI comparative fit index, RMSEA root mean square error of approximation

*** $p < 0.001$

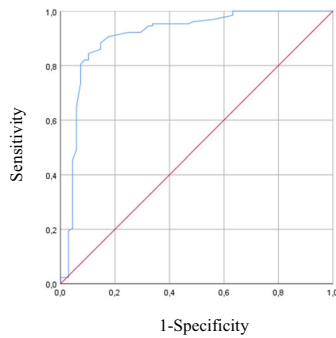


Fig. 1 ROC curve for the AS (blue curve). Note. The chance line is the red line. When the curve is closer to the upper left-hand corner of the graph, the diagnostic performance of the AS is better

Table 5 Acrimony scale intercorrelations

Acrimony Scale (AS)	AS Total score	AS Factor 1	AS Factor 2	AS Factor 3
Total Score	–			
Factor 1	0.93**	–		
Factor 2	0.91**	0.74**	–	
Factor 3	0.62**	0.41**	0.45**	–

Factor 1 = coparenting conflict issues and child involvement, Factor 2 = unfriendly and unsupportive coparenting relationship, Factor 3 = child–parent relationship impact

** $p < 0.01$

Table 6 Convergent validity

Constructs	AVE	CR
Factor 1	0.39	0.94
Factor 2	0.50	0.87
Factor 3	0.52	0.87

Factor 1 = coparenting conflict issues and child involvement, Factor 2 = unfriendly and unsupportive coparenting relationship, Factor 3 = child–parent relationship impact

AVE average variance extracted (good ≥ 0.50), CR composite reliability (good ≥ 0.70)

All coefficients were significant at $p < 0.05$. The sensitivity was 91.4 (meaning that there were few false-negative results - Type II error), and the specificity was 77.9 (meaning that there were few false-positive results - Type I error). The

Table 7 Discriminant validity - HTMT

	Factor 1	Factor 2	Factor 3
Factor 1	0.33		
Factor 2	0.74 CI _{.90} [0.67, 0.79]	0.51	
Factor 3	0.41 CI _{.90} [0.30, 0.52]	0.45 CI _{.90} [0.37, 0.53]	0.42

Factor 1 = coparenting conflict issues and child involvement, Factor 2 = unfriendly and unsupportive coparenting relationship, Factor 3 = child–parent relationship impact

Values on the diagonal (in boldface) are square root of the average variance extracted, while the off-diagonals are correlations

Table 8 Known-groups differences between the subsamples in coparental acrimony

	Conflictual Mean (SD)	Nonconflictual Mean (SD)	t	d de Cohen
Factor 1	25.37 (7.20)	15 (5.20)	–10.48***	2.79
Factor 2	23.41 (4.24)	13.34 (5.03)	–14.81***	2.13
Factor 3	8.41 (3.31)	6.75 (2.97)	–3.58***	0.50
Total	57.19 (11.56)	35.09 (11.55)	–12.75***	1.91

Factor 1 = coparenting conflict issues and child involvement, Factor 2 = unfriendly and unsupportive coparenting relationship, Factor 3 = child–parent relationship impact

*** $p < 0.001$

structure matrix of the correlations between the discriminating variables and the one discriminant function suggests that the AS total score ($r = 0.83$), the Factor 1 ($r = 0.68$) and the Factor 2 ($r = 0.96$) subscales provided the best contributions to the obtained function relative to Factor 3 ($r = 0.23$).

The Portuguese version of the AS demonstrated a very significant multivariate discriminant capacity between conflictual and nonconflictual divorced parents.

The optimal cutoff score for the AS

Figure 1 shows the ROC curve calculated to establish the discriminating power of cutoff points through the severity

Table 9 Discriminant analysis and percentage of correctly classified cases

Total/Subscales	Wilks' Lambda (χ^2)	Canonical correlation	Cases of coparenting conflict	Cases of noncoparenting conflict
AS_Total score	0.54 (162.43)***	0.83	82%	89.7%
Factor 1	0.64 (86.8)***	0.68	71.1%	91.2%
Factor 2	0.47 (146.35)***	0.96	85.9%	86.8%
Factor 3	0.94 (11.63)*	0.23	59.4%	72.1%

Factor 1 = coparenting conflict issues and child involvement, Factor 2 = unfriendly and unsupportive coparenting relationship, Factor 3 = child–parent relationship impact

* $p < 0.05$; *** $p < 0.001$

Table 10 HMR Results for the AS ($N = 196$)

	Divorce Adjustment			Positive Divorce Resolution		
	B	SE B	β	B	SE B	β
Parental role/sex	−4.39	2.08	−0.10*	−1.60	0.65	−0.13*
Age	0.21	0.16	0.07	0.05	0.05	0.06
Socioeconomic level	−7.08	3.58	−0.09*	0.90	1.12	0.04
Educational level	3.82	8.01	0.02	2.97	2.40	0.06
Intimate relationship length	−0.01	0.01	−0.05	0.004	0.004	0.05
Time since separation	−0.01	0.02	−0.02	−0.01	0.01	−0.11
Separation mode	−2.44	2.21	−0.06	−0.44	0.69	−0.04
Joint legal custody	−2.90	3.20	−0.06	1.22	0.10	0.09
Joint physical custody	−2.39	3.66	−0.04	1.52	1.14	0.10
Previous conflict	−3.73	2.05	−0.09	−1.74	0.64	−0.14**
AS	−1.04	0.07	−0.76***	−0.28	0.02	−0.71***
R^2 Step 1	0.21			0.18		
F for ΔR^2 Step 1	4.79***			4.04***		
ΔR^2 Step 1 to 2	0.43			0.39		
F for ΔR^2 Step 2	213.59***			168.37***		

The coefficients are from the final model; β = standardized regression coefficients, R^2 , and change R^2 (ΔR^2) HMR hierarchical multiple regression, AS acrimony scale

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

ratings of the AS total score. The AUC was 0.91 (95% CI [0.86, 0.96, $p < 0.001$]), which shows excellent utility and accuracy when discriminating between low and moderate to high levels of coparental acrimony. The ROC analysis demonstrated that the acrimony scores provided a highly statistically significant prospective prediction for coparental acrimony. According to the highest value found for the Youden Index (J Index = 0.74), a score of 44.50 or higher on the AS is the ideal cutoff because it better balances the sensitivity (0.84) and specificity (0.90) values. Therefore, 84% of all conflictual divorced parents with AS total scores ≥ 44.50 were correctly detected as having a moderate-to-high level of coparental acrimony and a specificity of 0.90 (10% of conflictual divorced parents were incorrectly identified as having a moderate-to-high level of coparental acrimony). Thus, there was a 91% probability that the diagnosis of highly conflictual divorced parents was correct.

HMR

Considering tolerance values < 0.10 and VIF values > 10.0 as suggestive of extreme multivariate collinearity (Kline, 2011), no evidence of collinearity was detected. Thus, it was considered appropriate to perform the subsequent hierarchical multiple regression analyses. As shown in Table 10, the overall model accounted for a significant variance in each of the divorce adjustments, $\Delta R^2 = 0.43$, $F(1,18) = 213.59$, $p < 0.001$, and positive divorce resolution, $\Delta R^2 = 0.39$, $F(1,18) = 168.37$, $p < 0.001$, beyond that of the control variables. As expected, the AS scores made a significant negative contribution to divorce adjustment, $\beta = -0.76$, $p < 0.001$ (squared partial correlation = -0.73), and positive divorce resolution, $\beta = -0.71$, $p < 0.001$ (squared partial correlation = -0.69). Thus, the parents who have a more acrimonious coparenting relationship with their

former spouse reported both less divorce adjustment and less positive divorce resolution.

Discussion

The literature on divorce is replete with evidence that parents pose significant risks to the wellbeing of their children and, indeed, to the maladjustment of all family members when they remain entrenched in ongoing acrimonious postdivorce coparenting conflict (Langenbrunner et al., 2013). Coparental acrimony is an important construct to assess in family settings – especially in the families that are at risk – and it is crucial to have validated instruments to conduct this evaluation. This is the first study that aims to translate and cross-culturally adapt the AS to the Portuguese context to analyze the psychometric properties of the AS in a national sample of divorced parents, and it is also, to the best of our knowledge, the first worldwide study that finds support for the structural validity of the AS.

To use the AS in clinical or other applied contexts, we followed the recommendations that the psychometric qualities of a translated test can only be determined by empirical and logical evidence (Gudmundsson, 2009). Establishing and reporting the psychometric properties of a measure is fundamental to its utility in testing theory, designing interventions, and making clinical decisions (Gremigni, 2020). Furthermore, it is imperative to translate psychological and family functioning measures into different languages so that more communities and cultures can benefit from research advances. For example, the Portuguese psychometric validation of the AS enables its clinical-forensic use in other countries, where the Portuguese population is numerous (e.g., Luxembourg - the country with the highest rate of divorce in Europe) or even in Portuguese-speaking countries, such as Brazil (in which parental alienation has a high incidence).

The Portuguese version of the AS proves to be a robust and reliable self-report measure of acrimonious coparenting conflict in separated or divorced parents by having fulfilled the recommended criteria in the construct, criterion-related validity and reliability analyses. The translation procedures, back translation, and face and content validity helped achieve semantic, idiomatic and cultural equivalence during the adaptation of the AS. The measurement scale was validated after excluding three original items (8, 24 and 25) that consumed a low corrected item-total coefficient (below 0.20). Although these items, mainly items 24 (“Have you adjusted to being divorced/separated from your former spouse?”) and 25 (“Has your former spouse adjusted to being divorced from you?”), are theoretically and empirically related to coparental acrimony, their poor item validity in our study may suggest the need for them to be assessed

by their indicators or by latent variables that use other specific validated measures, such as DAI-R (Portes et al., 2000; Portuguese version of Lamela et al., 2009) or PAST-A (Sweeper & Halford, 2006; Portuguese version of Lamela et al., 2014). Notably, directly questioning one person about his or her postdivorce adjustment condition or that of his or her former spouse may not produce the same result as measuring this adjustment through their clinical indicators. Moreover, it was possible to verify in our data that the acrimony measure (the AS) contributes significantly to the variance in the postdivorce adjustment individual measure that was used (DAI-R).

The CFA showed that the goodness of fit indices were not satisfactory using the original unidimensional theory-driven model of the AS, which suggests that the AS assesses multiple domains. The tridimensional model of the AS obtained through EFA indicated three clusters of typical acrimonious coparenting relationship dynamics, namely, (1) *coparenting conflict issues and child involvement*, (2) *unfriendly and unsupportive coparenting relationship*, and (3) *child-parent relationship impact*. Although much of the literature has tacitly considered parental conflict as a unidimensional construct characterized by hostility or global discord (e.g., Cummings & Davies, 2002), conceptualizations of parental conflict have increasingly demonstrated the value of distinguishing between the microsystemic factors in high-conflict cases (i.e., multiple issues of disagreement, child involvement and child–parent relational problems) (Polak & Saini, 2019). A systemic multidimensional approach suggests that coparental acrimony can be better captured by differentiating among various hypothesized manifestations of coparenting conflict.

The AS three-factor structure that consisted of 22 items had an explained variance of 57.5% and has been shown to have an appropriate latent construct to measure coparental acrimony, as its fit indices were achieved, which indicates acceptable construct validity. This study confirms the findings of previous studies that reported high internal consistency for the AS among divorced parents (e.g., Berry et al., 2010; Emery et al., 2001; Shaw & Emery, 1987). The model-based reliability for the total and each construct was excellent, as indicated by Cronbach’s alpha values greater than 0.80.

The criteria of convergent validity include ≥ 0.70 CR and ≥ 0.50 AVE. Except for Factor 1, the AVE extracted was < 0.50 , which means that the amount of variance was too small to explain the latent construct. However, Fornell and Larcker (1981) suggested that the use of CR alone (≥ 0.70) is sufficient to confirm convergent validity. Thus, this study confirms the convergent validity of the AS. Discriminant validity was established by HTMT_{.85} and HTMT inference. Predictive known-groups validity showed, as expected, that conflictual divorced parents

scored significantly higher than nonconflictual divorced parents on the AS scores. DFA indicated that a linear combination of the three subscales significantly discriminated between divorced parents with high and low AS scores. These results suggest that the subscales can function as a rapid and useful screening instrument for divorced parents with a high risk of intense and prolonged conflict in clinical-forensic practice. The subscales of the AS correctly classified 86.7% of the cases. A cutoff score was established by calculating the AUC in the ROC analysis and by using Youden's index. A cutoff score equal to or greater than 44.5 on the AS total score yielded 84% sensitivity and 90% specificity and was the value nearest to the AUC value (0.91). The AUC value of 91% suggests that the AS is a test of high diagnostic utility and a tool that can be used to detect clinically significant levels of coparenting acrimony in divorced parents. This cutoff allows for a more descriptive interpretation of AS scores, which creates an opportunity for practical utility in clinical, forensic and research settings. Although not recommended as a standalone assessment, such results are important for the broad clinical use of this measure (for example, referring families for additional and specialized services) and for the conceptualization of high-conflict divorce cases.

In turn, hierarchical regression analyses also indicated that the AS subscales generally predicted divorce adjustment and positive divorce resolution after controlling for the sociodemographic, divorce, and conflict-related variables. These findings support the predictive criterion validity, and they are consistent with previous literature (Amato et al., 2011; Bonach & Sales, 2002; Demby, 2009). Prior research indicates potential theoretically based explanations and/or mechanisms of the associations between coparenting acrimony and divorce adjustment and resolution, namely, (1) the forgiveness of the former spouse is a mediator between the processes of postdivorce adjustment and coparenting quality (Bonach & Sales, 2002) and that it contributes to lower conflict in the postdivorce parental relationship (Rye et al., 2012), and (2) the nonacceptance of marital termination is also positively associated with coparenting conflict (Sbarra & Emery, 2005).

Limitations

Although the current study suggests that the Portuguese version of the AS is a reliable measure, some study design limitations should be acknowledged. First, using a non-probabilistic sample (by convenience) limits the generalization of the conclusions. Second, although it has been demonstrated that web-based studies are reliable and present several advantages (e.g., larger and more diverse samples and motivated participants; Gosling et al., 2004),

they may increase the likelihood of self-selection bias, which may have obscured differences between the sample variables. Third, the disproportionate number of fathers (35.1% to 64.9% mothers) and nonconflictual divorced parents (34.7% to 65.3% conflictual cases) can compromise the representativeness of the sample. Additionally, the subsample of conflictual divorced parents represents only part of the community and forensic population with this problem. Fifth, the wide range of the participants' ages (28–65 years old) and the family cycle's different stages could also be problematic. This can result in divergent perceptions of family transitions and postdivorce family functioning, affecting the quality of the measure. Sixth, the added measurement error covariances to the initial model may also limit our results. Post hoc modifications may restrict a cross-validation of the structure and replication of the model in future studies (Bryne, 2010; Hermida, 2015). Seventh, the subsamples of conflictual and nonconflictual divorced parents were created from the self-reports of the study participants, but no clinical assessment or diagnosis was undertaken by other sources to corroborate these data. Eighth, the exclusive use of self-report measures, particularly for coparental acrimony or coparenting conflict, introduces a monomethod bias. The self-reported results could be subject to social desirability and cognitive error bias, as many of the items involved asking the study participants to consider their own conflictual behaviors or his or her former spouse's behavior. For these reasons, divorce and parental conflict assessment guidelines emphasize the need for comprehensive multimethod, multimodal, and multi-informant methodologies. Ninth, the cross-sectional design (only administered once) and the concurrent nature of the results cannot preclude causal relationships between parental conflict and divorce adjustment and did not allow for the test-retest stability in the reliability over time.

Future studies should consider replicating these results in a larger and more nationally representative sample of divorced parents, with an equal or similar proportion of mothers and fathers, and eventually divorced parental dyads. Prospective research on the role of coparental acrimony in divorce adjustment is also needed to disentangle the direction of effects. Finally, investigating the factor structure of the AS among more culturally diverse populations and clinically and forensically identifying highly conflictual divorced parents are needed.

Conclusion and the Clinical-forensic And Research Implications

Despite these limitations, the current study demonstrates important strengths. To the best of our knowledge, this is the first successful psychometric validation of the AS,

including in the Portuguese context. It represents an important advancement in the study of postdivorce coparenting conflict, as acrimony has been found to be a salient predictor of parents' and children's adjustment (Henley & Pasley, 2005). This study provides initial and sufficient evidence that the AS is a reliable and valid measure of coparenting conflict and may be of great utility both for research and clinical-forensic settings, mainly in identifying, as early as possible, not only the families that need support to ameliorate poor postseparation adjustment but also the families at risk of disengaging from separation or postdivorce conflict-related services, such as family mediation. It can also be used to evaluate parents' outcomes in psychotherapy and psychosocial programs and the effectiveness of the offered services. Finding a way to identify early in the process divorcing or separating parents who might be at risk of ongoing conflict would provide a way to direct them to appropriate interventions. A specific practical example of where the AS could be deployed is the integrative and multisystemic tertiary intervention program – For2Parents – that was developed by two authors of this study (JP and MM) for treating highly conflictual divorced parents in which the AS is one of the measures included in the longitudinal within-subjects protocol on the feasibility and effectiveness assessment of this intervention.

Accordingly, this study is an essential first step, and further studies should be conducted to extend, refine, and replicate these findings with other samples of separated or divorced parents, both in Portugal and in other countries. We hope that researchers from different countries interested in the assessment of postdivorce coparenting conflict or acrimony will translate and investigate the psychometric properties of the AS to test the cross-cultural validity of the scale. In this way, the AS could be used as a valid and reliable outcome measure for an international comparison of relevant inquiries, such as the impact of distinct child custody statutory laws on the levels of postdivorce coparenting conflict or on the rates of filing complaints of restrictive parental gatekeeping after divorce (see the example of Goldfarb et al., 2019).

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Compliance with Ethical Standards

Conflict of Interest The authors declare no competing interests.

Ethical Approval Research involving Human Participants: all procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent All participants provided informed consent via an online consent form before commencing the study.

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