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Severity and Frequency of Antisocial Behaviors: Late Adolescence/Young Adulthood Antisocial Behavior Index

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Abstract

Objectives—An Antisocial Behavior index (ASB-I) for children (ages 5 to 15) was previously developed by obtaining clinician ratings of the seriousness or severity of various behaviors with the goal of improving assessment of antisocial behaviors (ASB) longitudinally. We extend the instrument for use in late adolescence/young adulthood, as socially unacceptable conduct manifests differently across developmental stages. As in the original study, this extension (the ASB-I YA) is based on independent ratings of ASB seriousness/severity during late adolescence/young adulthood (16 to 28 years) made by nine experienced clinicians.

Methods—The items rated were drawn from the Oppositional Defiant Disorder and Conduct Disorder schedules of the NIMH Diagnostic Interview Schedule for Children (DISC-IV) and the Elliott Delinquency scales, plus new or modified items developmentally appropriate for late adolescence/young adulthood. Specific ratings were based on the developmental stage and reported frequency of the behaviors. The study also describes the distribution of ASB-I YA scores in the Boricua Youth Study.

Results—Reliability was substantial for the average ratings of each subscale and for the total score [ICC(3,9): .88 to .95]. Certain items were rated as more severe when occurring in late adolescence/young adulthood compared to childhood/early adolescence (e.g., hitting someone on purpose); however, most ratings were similar across developmental periods. Most importantly, raters reliably and consistently rated the items describing ASB in young adulthood, allowing the computation of the ASB-I YA score.

Conclusions—Together with the ASB-I, the ASB-I YA can further advance the study of ASB progression from childhood into young adulthood.

Keywords

developmental psychopathology; antisocial behaviors; classification; psychometrics; longitudinal measures; young adulthood

Measuring antisocial behaviors (ASB) across different developmental periods is a challenge because different antisocial behaviors (ASB) may emerge at specific developmental periods or change in characteristics from childhood to early adulthood (Burke, Loeber, Lahey, & Rathouz, 2005; Lahey, Zald, Hakes, Krueger, & Rathouz, 2014; Loeber, 1991). ASB does not necessarily become more severe throughout development; rather, behaviors may appear different at later points of the life course, while still manifesting the same underlying developmental process (Lahey et al., 2014; Loeber, 1991). It is not uncommon for behaviors or symptoms to evolve over time leading to the well-described phenomenon of heterotypic continuity (Lahey et al., 2014; Rutter, Kim-Cohen, & Maughan, 2006; Shevlin, McElroy, & Murphy, 2017). Tracking this developmental process requires a measurement strategy able to capture both the specificity and the continuity of ASB across different developmental periods. Bird et al. (2005) developed the childhood/early adolescence ASB index (ASB-I), which brings together information on ASB in childhood and early adolescence, combining behavior items that describe ASB drawn from different assessment instruments (described below) and asking experienced clinicians to rate the severity of those behaviors when applied to specific age groups.

The transition from childhood to young adulthood presents a special challenge for the developmental assessment of behavioral and emotional problems. This challenge is particularly pronounced when measuring ASB. Developmentally, there may be significant differences in the characteristics and consequences of certain behaviors when manifested by young children versus young adults, although they can be expressed by identical items on ASB scales. For example, the act of blaming someone else for one's mistakes and misbehaviors may have very different implications and outcomes in childhood and adulthood. Among children, the most severe consequence for wrongful blaming might be the child facing disciplinary action at school, while among young adults this behavior would be considered more severe as it could result in criminal charges. There is often a fine line between normal and abnormal behavior at various developmental stages. Among adolescents, for example, it might be relatively common to lie about one's age to get into a bar so as to spend time with friends, but the same behavior would not be relevant for young adults who can legally drink. The difference between hitting other children in a typical childhood squabble and assaulting other adults exemplifies the transition from deviant to possibly criminal behavior. As children become adolescents and young adults, the same behavior can transition from an acceptable marker of deviancy to law-breaking actions leading to severe consequences.

Two approaches have been taken to measure ASB longitudinally: the diagnostic (categorical) and the dimensional approaches. The diagnostic approach utilizes a strategy unique in the classification of psychiatric disorders, labeling ASB differently depending on the developmental period in which it occurs. If the ASB symptoms occur before the age of 18 they indicate either Conduct Disorder (CD) or Oppositional Defiant Disorder (ODD) (American Psychiatric Association, 2013). ODD is characterized by disobedience and hostility toward authority figures, whereas children with CD exhibit a pattern of behavior that violates age-appropriate social norms and lack respect for the rights of others (American Psychiatric Association, 2000, 2013). In DSM-IV, when disregarding or violating the rights of others persisted over time into adulthood and was corroborated by a diagnosis of CD before the age of 15 (American Psychiatric Association, 2000), then a diagnosis of antisocial personality disorder (ASPD) in adulthood was warranted (American Psychiatric Association, 2000). With the advent of DSM-5, although the pattern of antisocial behaviors since childhood is still considered important, a previous diagnosis of CD is no longer required (American Psychiatric Association, 2013).

Longitudinally, the categorical approach relies heavily on diagnostic instruments to establish the diagnoses of ODD or CD in children and adolescents, and on other instruments to assess ASPD after participants have reached age 18 (Jacobson, Prescott, & Kendler, 2002; Luk et al., 2016). For example, Luk et al. (2016) reported on a high-risk sample of teenagers assessed for CD at baseline using the Diagnostic Interview Schedule for Children (DISC). At follow-up, the Diagnostic Interview Schedule (DIS) was administered to measure ASPD for participants ages 18–21 (Luk et al., 2016). Another study, the Children in the Community Study, assessed a representative sample of youths from upstate New York (Cohen, Brown, & Smiles, 2001). The investigators relied on the DISC for parents and a child report for youths aged 9–18 years old, and then switched to solely self-report, adjusting DISC items to increase age-appropriateness among young adults and adding extra

items adapted from the Personality Disorder Questionnaire for adults. The main limitation of the diagnostic approach until recently has been that because the diagnosis of ASPD used to require a CD diagnosis in childhood before the changes in DSM-5, the ability to identify trajectories that reflect developmental changes over time has been obscured (American Psychiatric Association, 2013). Those with subthreshold CD in childhood were missed or equated to having none or very low levels of symptoms.

The dimensional approach to the assessment of ASB is focused on measurement of the severity and frequency of behaviors, and it is usually limited to a specific developmental stage (Hudziak, Achenbach, Althoff, & Pine, 2007). The dimensional approach employs different strategies to examine change in ASB from childhood to early adulthood. Like investigators using the diagnostic (categorical) approach, investigators using the dimensional approach typically introduce a modified or new instrument at follow-up during young adulthood, allowing for the modification of existing items to make them more age appropriate or the addition of age-appropriate items (Cohen et al., 2001; Jung et al., 2017; Klump & Burt, 2006; Laird, Pettit, Dodge, & Bates, 2005; Lee, Herrenkohl, Jung, Skinner, & Klika, 2015; Lewin, Davis, & Hops, 1999; Shiner, 2000; Tubman, Windle, & Windle, 1996). Many of the specific items used at earlier developmental stages are modified to make them more age-appropriate (Cohen et al., 2001; Jacobson et al., 2002; Luk et al., 2016; Odgers et al., 2007; Wang, Niv, Tuvblad, Raine, & Baker, 2013).

Most studies measuring delinquency in youth administer the Child Behavior Checklist (CBCL, ages 6–18; parent-report), the Youth Self-Report (YSR, ages 11–18) and/or the Teacher's Report Form (TRF, ages 6–18) (Achenbach, 1991), all of which obtain information on ASB in children and adolescents (Jung et al., 2017; Klump & Burt, 2006; Laird et al., 2005; Lee et al., 2015; Lewin et al., 1999). These checklists can be utilized into early adolescence (Klump & Burt, 2006) and even young adulthood (Jung et al., 2017). However, when youth reach older adolescence or young adulthood, some studies choose to assess older participants with other age-appropriate self-report instruments, including the Adolescent Behavior Questionnaire and the Elliott Self-Reported Delinquency scale (Elliott, Huizinga, & Ageton, 1985; Laird et al., 2005; Lee et al., 2015; Lewin et al., 1999). Totally changing the measurement approach may preclude an adequate evaluation of the continuity/discontinuity of the underlying construct of ASB. The Elliott Self-Reported Delinquency scale assesses whether youths have participated in criminal behavior and the frequency with which they have done so. The Dunedin Longitudinal Study, a prospective cohort study of youths in New Zealand enhanced the assessment by adding ASB items specific to a later developmental period to improve the measurement of antisocial delinquent behaviors in the young adult years (Lee et al., 2015; Lewin et al., 1999; Odgers et al., 2007; Tubman et al., 1996; Wang et al., 2013).

The distinction between categories and dimensions is often blurred depending on the strategy employed to summarize indicators of ASB at different developmental stages. For example, some researchers create summary scores by counting the number of symptoms that are present at a given time or period (Cohen et al., 2001; Jacobson et al., 2002; Lee et al., 2015). Other strategies involve summing the antisocial symptoms that are present and implementing a cut-off at one standard deviation from the mean at each developmental

period (Achenbach, 1991; Cohen et al., 2001; Lewin et al., 1999; Moffit, Caspi, Dickson, Silva, & Stanton, 1996). Still another approach made use of factor analysis to create estimates of a latent variable for ASB based on six retrospectively ascertained symptoms (Nomura, Rajendran, Brooks-Gunn, & Newcorn, 2008). In the latter study three of the six items asked about frequencies of the following behaviors: school truancy, getting into trouble at school from fighting, and threatening to hit or hitting someone at school, while the remaining three assessed the time of first occurrence for certain events (e.g., misbehavior at school, suspension from school, running away from home). Earlier occurrence of those three behaviors (based on four school-related age categories) generated higher scores, such that among those with a history of those behaviors, high school students received the lowest score, and middle and elementary school students received the highest possible score (Nomura et al., 2008). While ranking items based on age is a good first step, only using six items to measure ASB is problematic, as some behaviors may be situational or normative for children at various ages and probably will not capture the full range of ASB. Additionally, retrospective self-reports are far from ideal when measuring ASB.

Longitudinal studies of ASB need some comparable metric to address questions about the development and persistence of ASB and to describe cases when maturity leads to a decline in manifested antisocial acts. For example, Moffitt (1993) elaborated a well-known theory regarding two different trajectories of anti-social development: adolescence-limited ASB and life-course-persistent ASB. The former reflects a pattern of ASB in which teenagers participate in ASB acts that in a way could be considered normative and highly attributable to peer influences. In these cases, the behaviors decrease significantly or desist as the individual progresses into adulthood. In the life-course-persistent trajectory, childhood psychological problems continue into adulthood coupled with negative social influences over the lifespan and result in persistent ASB, reflecting a serious personality disorder. Analyses of the Dunedin Longitudinal Study data mostly lend support for this developmental theory, with life-course-persistent young adults presenting with worse psychopathy, substance abuse, and physical health than those with adolescence-limited ASB (Moffitt & Caspi, 2001; Moffitt, Caspi, Harrington, & Milne, 2002; Odgers et al., 2007). Some researchers have questioned Moffitt's model, particularly in the field of neuroscience, with studies indicating that neurophysiological abnormalities are present in both life-course-persistent and adolescence-limited CD (Fairchild et al., 2011; Hyatt, Haney-Caron, & Stevens, 2012; Passamonti et al., 2010). To make advances towards the resolution of controversies such as this, researchers need to refine measurement of ASB across developmental periods.

Even if the diagnostic approach is used to create quantitative scores over developmental periods, or the dimensional approach is adapted to account for different developmental phases, the question of comparability of the ASB characterization at different ages remains. It was for this reason that some members of our team developed a novel approach to combine clinical and developmental perspectives to track ASB from childhood to early adolescence (5 to 15 years) (Bird et al., 2005). This strategy generated the ASB-I from reports of a list of behaviors that takes into account the severity or seriousness of the behaviors based on clinicians' ratings of each ASB item with consideration given to how often the behavior occurred and the developmental age. An algorithm was developed to

weight reports of ASB items based on the experts' ratings. The weighting required stable and clinically meaningful assessments of each behavior. Bird et al. (2005) showed that there was excellent interrater reliability among experienced clinicians, suggesting that the integration of behavior type, frequency, and developmental considerations in characterizing the severity could be done meaningfully. However, the original ratings were made for children in the age range of 5 to 15, and therefore left open the question of whether this approach could be adapted for older children.

The aim of this paper is to describe and provide psychometric information about an extension of the ASB-I to the late adolescence and young adulthood (ages 16 to 28) developmental period (the ASB-I YA). We present information on a new round of ratings of behaviors regarding their clinical relevance to the ASB construct for late adolescents and young adults that can be used to create the ASB-I YA. This extension made use of items included in the childhood/early adolescence ASB-I, modifying or rephrasing some that were not developmentally appropriate. In addition, it also added items pertinent to young adulthood that did not apply to children. The strategy of both adapting items from Bird et al. (2005) and adding new items is designed to provide continuity and to fully cover the late adolescence/young adulthood developmental period. Replicating methods employed for the childhood/early adolescence ASB-I (Bird et al., 2005), the ASB-I YA items were rated by clinicians in terms of their severity or seriousness taking into account the frequency of the behavior. In this paper, in addition to reporting the results utilizing the new ratings, we also compare them to the ratings pertaining to children, to highlight developmental changes. Finally, we provide, as an example, descriptive data about the ASB indices from ages 5 to 29, in a population-based cohort of Puerto Rican youth living in two different contexts: the South Bronx, NY and San Juan, Puerto Rico. Risk factors possibly related to development of antisocial behaviors are present in both sites. In the South Bronx, in addition to other risks, youth are also part of a racial/ethnic minority group and may experience racial/ethnic discrimination in their daily lives. The ASB-I (Bird et al., 2005) has been used in previous reports of ASB in the Boricua Youth Study (Bird et al., 2007; Morcillo et al., 2011; Okuda et al., 2018; Rivera et al., 2011; Wei et al., 2017) and the ASB-I YA can be calculated based on data newly collected as part of a follow up assessment of the same study. ASB changes in behavioral expression and frequency throughout development. Understanding the development of a disorder is integral to properly diagnosing and informing interventions at different stages in the course of the developmental process.

Methods

Participants

The participants consisted of nine clinicians: six were M.D. psychiatrists specializing in children, adolescents and adults and three were Ph.D. psychologists, with one specializing in children and adolescents and the other two specializing in both children and adults. Six of these clinicians had also participated in the development of the ASB scale for childhood/early adolescence (ASB-I) ten years earlier. Of the nine clinicians who scored the behaviors, four were in New York, one in California, and four in Puerto Rico; Clinicians were chosen to

balance expertise with antisocial behaviors, young adulthood and assessment of youth of diverse sociocultural backgrounds.

The items that are part of the ASB indices (ASB-I and ASB-I YA versions) were included in an ongoing population-based longitudinal study of youth of Puerto Rican background in two sites (South Bronx, NY and San Juan, PR), The Boricua Youth Study (N=2,491). The study started in 2000, when children were aged 5–13 years (Bird et al., 2006), and has recently finalized a fourth wave of assessment (Wave 4, youth ages 15–29, N=2,004 participants, more than 80% of original sample) (Alegria et al., 2019; Duarte et al., *submitted*). We used data from this longitudinal study to support the validity of the ASB indices for studying longitudinal change.

Procedure

To arrive at the ASB-I YA, procedures similar to those used to create the childhood/early adolescence ASB-I (Bird et al., 2005) were followed. Nine clinically experienced psychiatrists or psychologists individually assigned a score of seriousness or severity to each ASB item at designated frequencies in the CD and ODD modules (11 and 15 items, respectively) of the Diagnostic Schedule for Children (DISC-IV; Shaffer, Fisher, Lucas, Dulcan, & Schwab-Stone, 2000), the Elliott Self-Reported Delinquency scale (for children ages 10 and older; 34 items; Elliott et al., 1985) or Delinquency scale, and Delinquency Young Adult scale (14 items) by Moffitt, Caspi, Harrington, and Milne (2002). In total, the clinicians were asked to rate 67 behaviors derived from 74 items. A few behaviors were assessed through more than one item. Because each item was considered at either two or three levels of frequency (different scales had different numbers of response alternatives), the 67 behaviors yielded 187 separate ratings. The clinicians were sent either a web-based platform (Qualtrics) or paper survey (based on individual preference) and instructed to rate the level of seriousness of each behavior at each frequency for the specific developmental period indicated (16–28 years), based on their clinical judgment. They were instructed to rate the level of deviancy of the behavior and its frequency in the context of what they would consider to be the norm for the age group 16 to 28 years. They rated each behavior at each of the relevant frequencies on a scale from 0 to 5: 0 = none or trivial antisocial behavior; 1 = mild antisocial behavior; 2 = mild to moderate antisocial behavior; 3 = moderate to serious antisocial behavior; 4 = serious antisocial behavior; 5 = very serious behavior or when a serious behavior occurs more than once. The total 187 item/frequency combinations were independently rated by each clinician based on their occurrence during the past year. The 45 delinquency behaviors from the original Delinquency scale and the Delinquency Young Adult scale were rated for each of three levels of frequency in the past year (once, two times, or more than twice) yielding a total of 135 ratings. Eight ODD behaviors were rated at three levels of frequency: “present, but less than once a week”, “present about once a week”, and “present, more than once a week” for a total of 24 ratings. Fourteen CD behaviors were rated at two levels of frequency (once in the past year and more than once in the past year) totaling 28 ratings.

Clinicians rated each item independently, but the final consensus was based on the average of all the raters. The means of the clinicians’ ratings were rounded to the nearest whole

number to obtain a final rating that ranged from 0 to 5 for each assessed frequency of each behavior. Ratings were done individually, supported by a web-based platform. Independent data analysts analyzed the raters' scores.

Measures

Building on the measures used to create the original ASB-I, we considered items from widely used instruments assessing Oppositional Defiant Disorder (ODD; 11 questionnaire items, representing 8 distinct behaviors) and Conduct Disorder (CD; 15 items, representing 14 different behaviors) from the DISC-IV (Shaffer et al., 2000), and delinquency from the Delinquency scale (34 items, 34 behaviors; Elliott et al., 1985), and an expanded version of the Delinquency Scale that includes items relevant to young adults, the Delinquency Young Adult scale (14 items, representing 11 behaviors; Moffitt et al., 2002). Items that measured delinquency among younger children were drawn from an adapted Delinquency scale for young children (or the Self-Report Antisocial Behavior Scale; 29 items; not used in ASB-I YA) developed by Loeber, Stouthamer-Loeber, Van Kammen, and Farrington (1989) to obtain self-reports of ASB from children ages 5 to 9. Each of these instruments is described in detail below.

The DISC-IV is a structured diagnostic instrument designed for the diagnostic assessment of children and adolescents (Shaffer et al., 2000). It is available in English and Spanish and items inquire about specific behaviors necessary to ascertain DSM diagnostic criteria for a wide variety of childhood and adolescent psychiatric disorders (Bravo et al., 2001; Shaffer et al., 2000). CD was recorded at two frequency levels: "occurred only once in the past year" and "occurred more than once in the past year." During young adulthood, follow up questions were added to each item in the CD questionnaire to allow for the retrospective assessment of CD prior to age 15 ("Before age 15, have you ever...") to fulfill the DSM-IV diagnostic criteria for ASPD, which requires that some CD symptoms be present in childhood.

The ASB-I YA assessment obtained information on ODD using the DISC-IV ODD items with minor adjustments. (The wording for some items was changed to be more inclusive and age-appropriate.) For example, "caretakers or teachers/boss" was changed to "a person with some authority over you," which includes parents/caretakers, teachers, bosses, police officers, and other authority figures. ODD was assessed by the DISC, with items reflecting symptom criteria at three frequency levels for which each behavior had occurred within a period of six months. The frequency levels were as follows: "present but less than once per week," "present about once per week," and "present more than once per week."

The Elliott Self-Reported Delinquency Scale, intended for administration to youths ages 10 and older, is designed to focus on delinquent, rule-breaking behaviors (Elliott et al., 1985). The following prompts were specified to measure the frequency of each behavior itemized in the scale: "once in the past year," "two times in the past year," or "more than twice in the past year." There is some overlap with items assessed by the DISC (e.g., stealing, skipping school or work, getting into fights, breaking and entering) but most do not overlap (e.g., carrying a hidden weapon, using someone else's credit card, stealing a motor vehicle, using different types of illegal drugs or dealing drugs, etc.). Finally, minor changes to one item in

the original Delinquency scale were made to increase relevance for late adolescents and young adults. An item inquiring about skipping classes or school was modified to include employed youths or youth no longer attending school, by adding skipping work.

The assessment of ASB specifically in late adolescents and young adults was supplemented by items that were used to assess young adult participants in the Dunedin Longitudinal Study, the Delinquency Young Adult scale (Moffitt et al., 2002). These 11 behaviors (14 items; Moffitt et al., 2002) target experiences that are unlikely to have occurred in childhood, including legal matters, financial irresponsibility and deception. For example, participants were asked whether they have done any of the following: “moved away from an apartment or house without paying the final bills or rent,” or “embezzled money.” Items that were modified from the childhood/early adolescence version or newly added are indicated in Supplemental Tables 1–3.

Scoring the ASB-I YA

Similar to the childhood/early adolescence version, the ASB-I YA scoring algorithm is implemented as follows. Each young adult is assigned a rating (based on the clinicians’ rating average defined in this paper) for each behavior according to the frequency at which he/she reported the behavior, i.e. a rating of 0 for never or the final rating for his/her reported frequency of that behavior (e.g., 2 for once in the past year for specific behaviors or 3 for more than once in the past year). The final score of the ASB-I YA is the participant’s highest assigned rating across all behaviors; however, if the participant had two or more behaviors rated with his/her highest rating, then the participant’s final value for the ASB-I YA is one point higher than his/her highest rating (e.g., if a participant’s ratings included mostly 0’s, several 1’s and 2’s, and two 3’s, their final value for the ASB-I YA would be 4).

Data Analyses

We carried out three sets of analyses of the clinicians’ ratings of items and one analysis of the resulting ASB-I YA in the BYS study. First, we assessed the interrater reliability of the nine raters, both across and within the four subscales from which the items were obtained. Second, we examined the patterns of severity indicated by the mean ratings within the subscales and implemented a scoring algorithm to compute the ASB-I YA. Third, we compared the clinician ratings from this study, which focused on severity within older youth and young adults, to those obtained when creating the childhood/early adolescence ASB-I (Bird et al., 2005). Finally we used data from four waves of an ongoing longitudinal study to show average trajectories of ASB over more than 20 years. All analyses were conducted in SAS 9.4.

The reliability analysis addresses whether the 187 item/frequency combinations are given the same or similar severity ratings by different expert raters. We initially checked whether all the raters were in general agreement in how they rated the item/frequency combinations by computing correlations of the ratings of every pair of raters across items. Next, we calculated intra-class correlations (ICCs) that estimated the rater reliability for the ratings of items in the total set and also in specific subscales. There are several ICC forms (Shrout & Fleiss, 1979), but the one of most interest is whether the average of these nine ratings are

consistent for different item sets. This ICC form treats raters as fixed and is called ICC(3, k) (ICC(3,9) with k=9 raters). We also report an ICC estimate of whether a different group of 9 raters would give similar ratings to the raters reported here. This is called ICC(2,9) and it tends to be a bit smaller than ICC(3, 9) because the choice of raters can add to the variance of the mean ratings (Shrout & Fleiss, 1979). Following Shrout (1998) we interpret reliability in the range .61 to .80 to be *moderate* reliability and that between .81 and 1.00 to be *substantial*. The details of the computations are available in the notes section of Table 2.

To compare the ratings from the current study to those of the Bird et al. (2005) study, we simply compute the difference between behavior/frequency items from the Bird et al. (2005) study and those obtained in the current study. Because we are more interested in the pattern of differences than the ratings of individual items, we did not carry out significance tests (i.e. 187 *t* tests) of the individual ratings. Instead we report the distribution of the differences and comment on the patterns of change.

To assess the developmental utility of the ASB-I YA based on the current behavior ratings, we computed age-specific ASB averages across the four waves of data of the Boricua Youth Study (Bird et al., 2006), and plotted these with breakdowns of gender and site (South Bronx vs. San Juan Metropolitan Area). We also showed similar plots for a binary version of the ASB based on scores of 3 or higher.

Results

As expected, there was substantial variation in the severity across the items and across the frequency levels. For example, item 20 in the Delinquency scale (“Knowingly bought, sold or held stolen goods for someone else.”) obtained a score of 4.0 when it occurred more than twice in the last year, but only 2.2 if it only occurred once in the last year. Item 3 of the CD module (“Initiates physical fights.”) obtained a score of 3.1 when it was more frequent and 1.7 when it happened only once in the past year. The means and standard errors of the 187 item/frequency combinations averaged over the nine clinicians’ ratings are available in Tables S1–3.

Not only did the item/frequency combinations vary, the nine raters were in substantial agreement with how the items vary. Table 1 shows the extent to which the ratings of all pairs of clinicians correlated over items, as well as the median correlation for each rater. The overall correlations between each pair of raters’ ratings range from .50 to .81, with an overall median of .68 indicating satisfactory consistency among pairs of raters. The fact that these correlations are not perfect is likely to reflect the different perspectives of the clinical raters rather than simple measurement error. These perspectives are all combined by averaging the nine ratings for each item. Table 2 summarizes the ICC results for the average of the nine raters, which yields substantial reliability. Over all the items, the ICC(2,9) was .92 and the ICC(3,9) was .94. The ICCs were also substantial for the subscales. The lowest of the pairs of ICC(2,9) and ICC(3,9) were for Delinquency Young Adult Scale (.84, .88), but even these are in the substantial range in magnitude. The variance components used to calculate ICC(2,9) and ICC(3,9) (see Table 2 footnote) show that that the rater and error variance components are similar across the subscales, but the behavioral item variance

is somewhat less for the Delinquency Young Adult scale, which means that these items have similar levels of severity.

The number of final ratings on severity, from 0, 1, 2, 3, 4, to 5, across all behaviors and frequencies, were tabulated for each subscale (Table 3). In general, items in the CD, Delinquency scale, and Delinquency Young Adult scale have more severe ratings than the ODD scale.

When the ratings of the severity of items made in the context of young adulthood were compared to those made by Bird et al. (2005), we found that the majority did not change by more than one point. However, when changes occurred, they tended to indicate that the behaviors were considered more severe when related to young adults. Figure 1 displays the counts of final ratings that decreased by one point (−1), remained constant (0), increased by one point (+1), or increased by two points (+2) between the child (ages 5–15) and young adult (ages 16–28) final ratings. Ratings for most behaviors/frequencies remained constant (0) or increased by one point (+1). The means and standard errors of the nine clinicians' ratings for each behavior at each frequency, as well as the final rounded ratings, are displayed by subscale in Supplemental Tables 1–3. Bolded results indicate change in antisocial severity/seriousness level since childhood/early adolescence. For example, for staying out late, stealing with or without confrontation and hitting someone on purpose to hurt them the severity increased and for skipping school or work the severity decreased.

In Figure 2, plots of ASB computed using the childhood/early adolescence ASB-I (Bird et al., 2005) and using the ASB-I YA are shown by age, study site and gender using information from the Boricua Youth Study sample. These plots show that the ASB-I YA is higher among older youth, among boys/young men compared to girls/young women and higher in the South Bronx than in Puerto Rico, which is a pattern that was consistent in the earlier ASB-I measures. The level of the ASB-I YA means is also generally consistent with the means from the earlier waves. These results are promising as a first validity check.

Discussion

In this paper we described the development of a late adolescence and young adulthood ASB index (ASB-I YA) that extends an earlier ASB index (ASB-I) developed for children and younger adolescents (Bird et al., 2005). This extended index includes developmentally appropriate items that (a) coincide with a childhood/early adolescence ASB-I; (b) were reworded to make them more relevant in adolescence/young adulthood; or (c) were added to capture behaviors relevant to late adolescence and young adulthood that were not in the earlier instrument. Applying the same method used to create the childhood/early adolescence ASB-I, clinicians were asked to rate late adolescence/young adulthood items in terms of their severity or seriousness and frequency for this specific developmental stage. In a prior study with similar goal, Nomura et al. (2008) also adjusted for severity of certain behaviors when generating scores based on the age of occurrence; however, that study involved only six ASB indicators and relied on retrospective report.

There are four main findings in this study. First, the reliability of the clinicians' ratings was satisfactory for each subscale (fair under conservative assumptions, and excellent under less stringent assumptions, when considering the mean of ratings for each subscale). Second, raters were consistent in their ratings (indicated by substantial correlations between each pair of raters' ratings). Third, developmentally, most of the original ASB-I item ratings remained constant over time, however, some were higher in late adolescence/young adulthood compared to childhood/early adolescence. Fourth, there is initial evidence for the validity of the ASB-I YA, based on how it varies over time, gender and context.

The satisfactory level of agreement and consistency in how ASB indices items were rated by clinicians strongly supports the use of the ASB-I YA in late adolescence/young adulthood and extends our ability to assess ASB across childhood, adolescent and young adulthood. In Loeber's (1990) review of the literature regarding developmental pathways of ASB, he emphasizes that while there is some continuity in behaviors, behaviors also might change, emerge or expand over time. Typically, in childhood, ASB might include conduct problems and aggression, disobedience, and covert conduct problems such as truancy and stealing; in late adolescence and young adulthood these behaviors might diversify to include substance use and other more serious delinquent behaviors (Loeber, 1990). Utilized in research, this index has the potential to be a useful tool that can help us better understand the emergence and evolution of ASB across key developmental periods, while exploring factors that are correlated as well as those that are potentially causally related to changing trajectories over time. Such information can then guide the development of targeted prevention and intervention programs for ASB, that can include parent-focused or school-based programs targeting children and adolescents (Kellam et al., 2008) among other programs that can prevent and reduce ASB in young adulthood.

In addition, as expected, severity ratings for ODD were the least severe, with most behaviors concentrated in the middle range of the ratings rather than at the extremes, and with only one behavior/frequency rated above "moderate". The fact that the ratings of behaviors changed slightly but remained mostly constant across the different developmental periods suggests that the ASB indices may be measuring comparable ranges of ASB across developmental stages. Of all items, 34 increased by one point and three by two points. A reason why clinicians may have rated items higher in older youths could be that certain behaviors were assumed to have greater societal consequences when carried out by an adult or older adolescent. Interestingly, the fact that certain behaviors could have a higher emotional or individual cost when occurring in childhood rather than in adulthood (e.g., running away from home) did not seem to be a consideration in the way that behaviors were scored by clinicians (See Supplemental Tables 1–3). However, the fact that items remained stable or constant across the developmental periods may provide some evidence to suggest that ASB once begun in childhood, remains of similar ilk despite changes or advances in development. Examining what predicts changes in the manifestation of these similarly viewed behaviors across childhood, adolescence and young adulthood warrants further investigation and can possibly further examine Moffitt's adolescence-limited and life-course-persistent typology of ASB.

An analysis of the distribution of childhood/early adolescence and late adolescence/young adulthood ASB by age, study site and gender (in a population-based sample of Puerto Rican youth recruited in two sites as part of the Boricua Youth Study), corroborates the validity of the ASB-I YA. As expected, the late adolescence/young adulthood index was higher among older youth, among boys/young men compared to girls/young women and higher in the South Bronx than in Puerto Rico.

The observed developmental patterns may be at least in part determined by measurement variance issues. However, the clinician expert-based approach to item selection and rating in each developmental stage was an important step taken in the development of the ASB indices to minimize this problem. We do not claim that the ASB-I YA should necessarily replace dimensional assessments that have been normed for late adolescence and young adulthood in studies that focus only on that developmental phase. We hope that this new measure could be used, however, in longitudinal studies that follow children as they grow from children to adolescents to young adults. In developmental studies, multimethod approaches are needed to understand the clinical and societal implications of antisocial behaviors, and we believe a measure that is based on structural assessment and clinical weightings can add an important developmental perspective.

Limitations

Our results should be considered in light of the study limitations. First, the items selected as part of the ASB indices (either in the earlier developmental period or in late adolescence/young adulthood) may not represent all possible behaviors. Relevant behaviors for specific groups may have been left out of the index, and behaviors that were included may have been of minor relevance. The use of widely used scales (a diagnostic child interview and the two Delinquency scales) was the strategy employed to minimize the likelihood of substantial omissions or mistakes in the selection of items. Second, even though we obtained satisfactory reliability indicators for the ASB index in late adolescence/young adulthood, clinicians were selected based on their expertise being pertinent to our overall research goals, which includes urban inner-city youth and of Latino populations. If this method is to be used with a very different population or context it would be prudent to repeat the item-rating study with clinician raters who have knowledge of the norms of that population. Third, six out of the nine clinicians who rated young adult behaviors were the same clinicians who were originally selected because of their expertise with children. This may have made the ratings more consistent than they would be otherwise. Fourth, it would have been ideal to have a measure of impairment or an additional measure of antisocial behavior in the data set to further test the concurrent validity of the ASB-I YA.

The assessment of ASB throughout development is a challenge faced by clinicians and researchers who need to understand the developmental course of behaviors, which may or may not become aggravated over time. The ASB indices are an attempt to expand our understanding of the developmental course of ASB beyond what has been learned by our current categorical conceptualization, which may obscure important components of the developmental psychopathology of ASB disorders.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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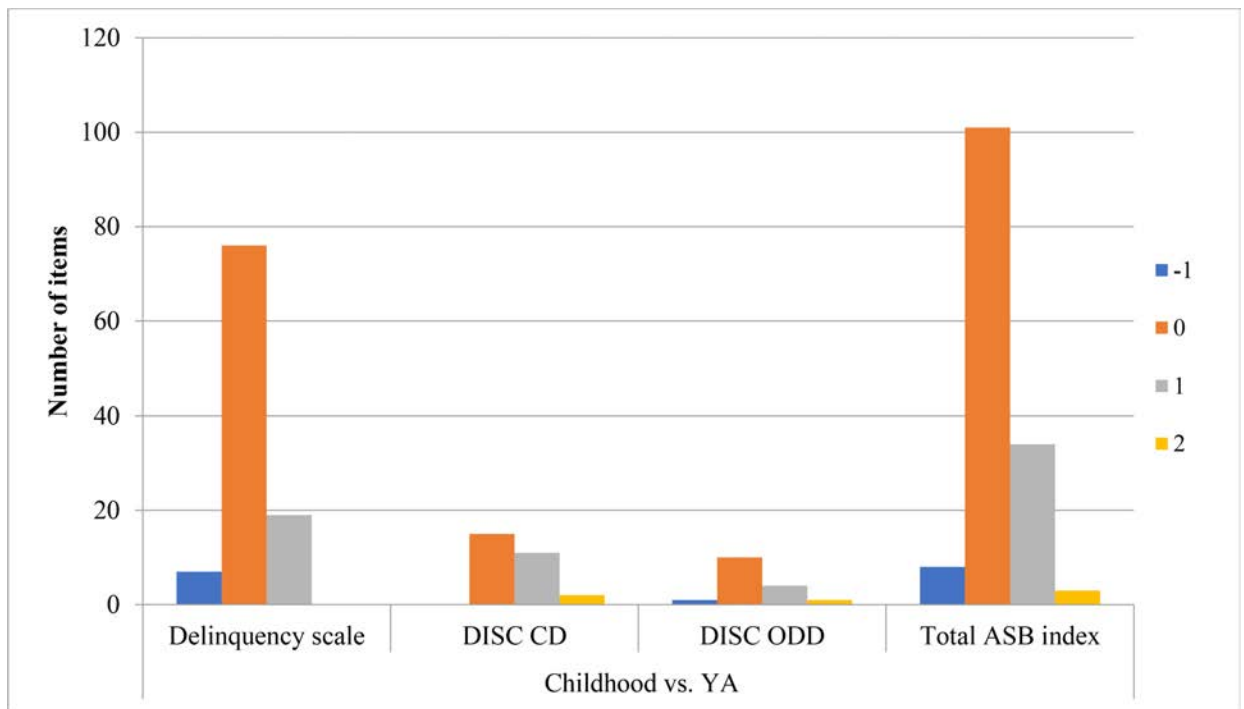


Figure 1. Change in clinicians' ratings of antisocial behaviors comparing children and early adolescents (Bird et al., 2005) with late adolescents and young adults (current study) by scale (Delinquency scale, CD and ODD)

Note: DISC CD=Diagnostic Interview Schedule for Children: Conduct Disorder; DISC ODD=Diagnostic Interview Schedule for Children: Oppositional Defiant Disorder; YA=young adulthood. Change was calculated as Bird et al. (2005) ratings minus current ratings.

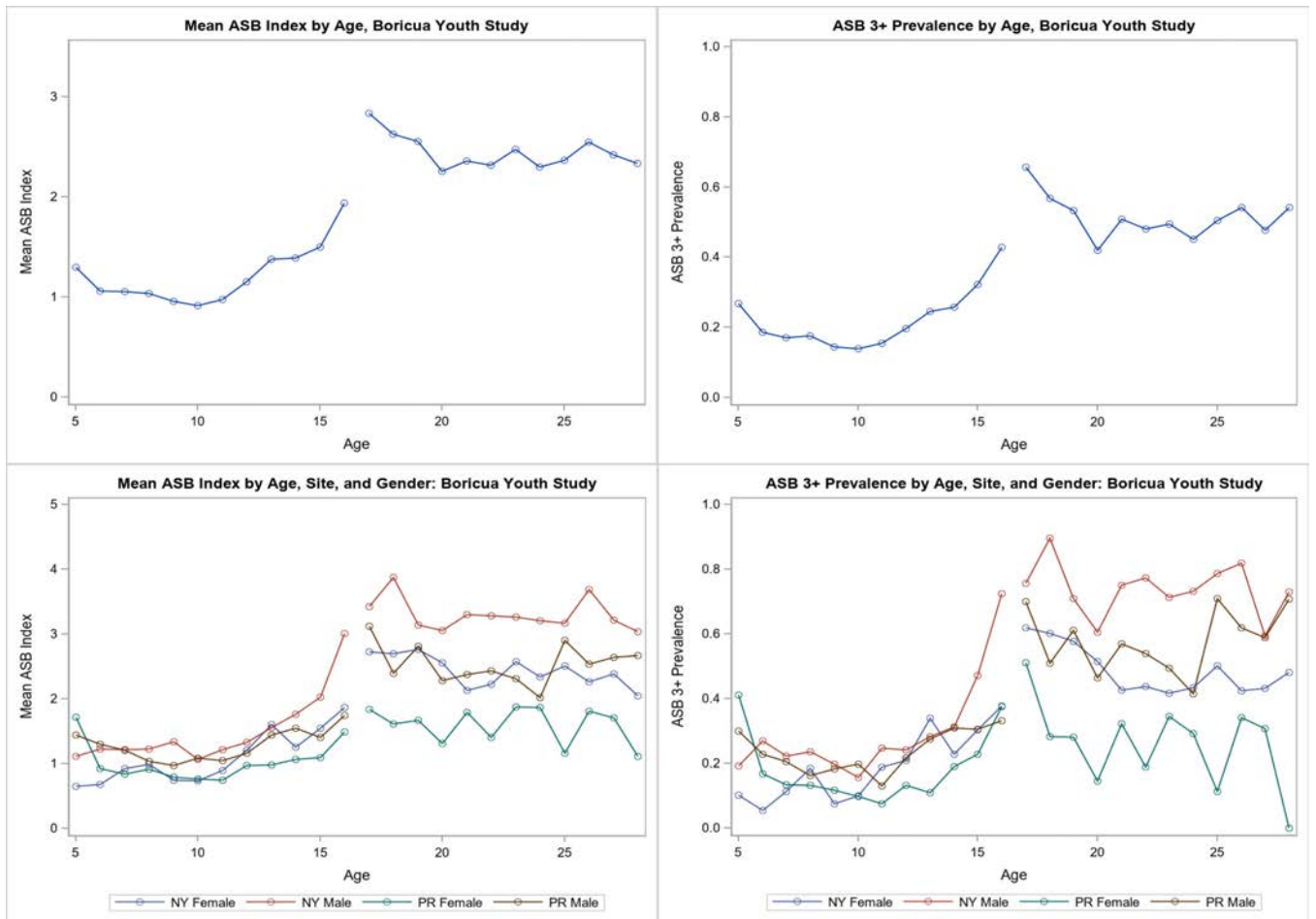


Figure 2. Antisocial Behavior index in the Boricua Youth Study

Note: These plots collapse those 17-year-olds in W3 with the 16-year-olds, and those 15- and 16-year-olds in Wave 4 with the 17-year-olds in Wave 4.

Table 1.

Correlation coefficients of clinician ratings of 196 item/frequency for pairs of nine clinicians and median of correlations for each rater

	1	2	3	4	5	6	7	8	9
1	1.00								
2	.75	1.00							
3	.68	.70	1.00						
4	.69	.65	.64	1.00					
5	.69	.69	.62	.72	1.00				
6	.73	.67	.64	.59	.65	1.00			
7	.75	.76	.71	.67	.73	.66	1.00		
8	.81	.70	.63	.65	.67	.70	.71	1.00	
9	.64	.51	.65	.50	.58	.68	.60	.58	1.00
M	.70	.69	.64	.65	.69	.66	.71	.68	.59

Note: M represents the median (rounded down) correlation for each clinician across eight correlations.

Average reliability of ratings and components of variance of Antisocial Behavior index items for late adolescents and young adults (ages 16–28)

Table 2.

Ages 16–28					
	Behavior ^c	Rater ^d	Error ^e	ICC(2,9)	ICC(3,9)
DISC ODD	0.93	0.15	0.47	0.93	0.95
DISC CD	0.87	0.53	0.66	0.87	0.92
Delinquency scale ^a	1.18	0.38	0.51	0.92	0.92
Delinquency Young Adult scale ^b	0.62	0.33	0.76	0.84	0.88
Delinquency total	1.02	0.35	0.60	0.91	0.94
ASB-I YA	1.18	0.28	0.65	0.92	0.94

Note: DISC CD=Diagnostic Interview Schedule for Children: Conduct Disorder; DISC ODD=Diagnostic Interview Schedule for Children: Oppositional Defiant Disorder; ASB-I YA=Late adolescent/young adulthood Antisocial Behavior index.

^aElliott Self-Reported Delinquency scale (Elliott et al., 1985).

^bDelinquency Young Adult scale (Moffitt, Caspi, Harrington, and Milner, 2002).

^cVariance component for behavior items: VB.

^dVariance component for rater: VR.

^eVariance component for error: VE. The formula for ICC(2,9) = $VB/(VB + VR/9 + VE/9)$ and for ICC(3,9) = $VB/(VB + VE/9)$. Reliability goes up when VB is large relative to VR and VE. See Shrout & Lane (2012).

Table 3.

Antisocial Behavior index in late adolescents and young adults: Counts of final ratings of severity by subscale

	Age Range	0 = None or Trivial	1 = Mild	2 = Mild to Moderate	3 = Moderate	4 = Serious	5 = Very Serious
DISC ODD (8 behaviors, 3 frequencies) ^a	5-15	5 ratings	8 ratings	8 ratings	3 ratings	-	-
	16-28	2 ratings	7 ratings	9 ratings	5 ratings	1 rating	-
DISC CD (14 behaviors) ^b , 2 frequencies	5-15	-	5 ratings	7 ratings	10 ratings	7 ratings	1 rating
	16-28	-	1 rating	6 ratings	11 ratings	8 ratings	2 ratings
Delinquency scale (29 (ages 5-9) or 34 behaviors) ^c , 3 frequencies	5-9	4 ratings	20 ratings	26 ratings	27 ratings	8 ratings	2 ratings
	10-15	-	11 ratings	23 ratings	31 ratings	32 ratings	5 ratings
	16-28	-	13 ratings	16 ratings	29 ratings	37 ratings	7 ratings
Delinquency Young Adult scale (11 behaviors, 3 frequencies)	5-9	-	-	-	-	-	-
	10-15	-	-	-	-	-	-
	16-28	-	-	10 ratings	14 ratings	8 ratings	1 ratings

Note: DISC CD=Diagnostic Interview Schedule for Children: Conduct Disorder; DISC ODD=Diagnostic Interview Schedule for Children: Oppositional Defiant Disorder; ICC=intra-class correlation coefficient.

^a 11 behaviors were assessed with the ODD module, but for comparability with childhood/early adolescence clinician ratings, 3 items were merged with other items based on similarity.

^b Two items (bully, threaten others) were combined into 1 behavior for comparability with childhood clinician ratings.

^c Delinquency Young Adult scale ratings for “sold marijuana, weed, pot, or phillies (or ‘blunts’), or hashish” and “sold hard drugs, such as heroin, cocaine or LSD” were combined for comparison to “sold drugs to anyone,” the item used in the childhood/early adolescence measure.