

Psychometric Studies of the Swedish Version of the Adolescent Drug Abuse Diagnosis (ADAD) Instrument

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Abstract

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This thesis describes studies into the psychometric properties of a Swedish language version of the Adolescent Drug Abuse Diagnosis (ADAD) instrument. The psychometric properties of this instrument have been examined in two previous studies: an American study was conducted by the developers of the interview, Friedman and Utada (1989), and a Swiss study was undertaken by Bolognini et al. (2001). The American and the French (as used in the Swiss study) versions of ADAD exhibit good validity and reliability, in the form of both interrater reliability and the internal consistency of the composite scores. Study I evaluated the psychometric properties of the Swedish version of the ADAD interview in normal adolescents and adolescents with antisocial problems. It was found that the instrument has good interrater reliability, that the composite scores exhibit moderate internal consistency, and that the concept validity was acceptable and similar to that of the American and Swiss versions. The results also showed that the problem areas of ADAD produced meaningful correlations. The interviewer ratings, the adolescent's ratings and the composite scores were compared and discussed. Some problems concerning the composite scores were discovered and will need to be analyzed in future studies. Study II investigated the utility and problems associated with the composite scores in the ADAD within and between normal adolescents and adolescents with antisocial problems. When comparing interviewer severity ratings and composite scores within the two groups, the composite scores were found to behave differently to the interviewer ratings. For normal adolescents, the composite scores are generally higher than the interviewer ratings, but for the adolescents with antisocial problems the reverse is true. The interviewer severity ratings seem to be the most appropriate outcome when the objective is to separate antisocial and normal groups of adolescents from each other. The difference between the two groups is smaller as measured by composite scores. The composite scores appear to function as viable indicators of current problems in all areas except for Medical and Alcohol problem area. The critical items within the Medical and Alcohol composite

scores are explored and discussed. Study III investigated the concurrent and predictive validity of the ADAD Psychological status and problem area. Concurrent validity was demonstrated by significant correlations between the ADAD, Youth Self Report (YSR) and Beck Depression Inventory (BDI) scores. The predictive validity of this problem area of the ADAD was tested by exploring its correlations with the YSR, BDI, and DICA problem ratings; moderate correlations were observed, suggesting that in clinical practice, the ADAD Psychological status and problem area may be a useful tool for the assessment and measurement of current psychological problems. The utility obtained by making decisions using the test is substantial. Overall, the results of these studies indicate that the Swedish version of ADAD appears to be a psychometrically good instrument for assessing the severity of adolescents' problems and their need for treatment, but there are some problems with the Medical and Alcohol composite scores.

Key words: ADAD, validity, reliability, assessment, psychometric, severity index, composite score, normal; antisocial adolescents, psychological health

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Lingham, November, 2011

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Lists of papers

This doctoral thesis is based on the following studies:

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- III. Börjesson, J., Ybrandt, H. (2010). Concurrent and predictive validity of the Adolescent Drug Abuse Diagnosis (ADAD). Manuscript submitted for publication.

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INTRODUCTION

The National Board of Institutional Care (SiS) is a state authority that has been responsible for the management of special youth homes in Sweden since 1994. These homes provide treatment and care to youths between the ages of 10 and 20 who exhibit problematic antisocial behaviour and have been detained under the Swedish Care of Young Persons Act (LVU); the homes' residents may be admitted on a voluntary or involuntary basis (Söderholm Carpelan & Hermodsson, 2004). When SiS was formed in 1994, one of its stated goals was to allow for a greater degree of research, development and evaluation than had previously been possible; to this end, a research and development unit was created. The main tasks of this unit are to initiate and support research relating to the clients of SiS, to support development and training projects within the institutions, and to manage and develop a client documentation system that can meet their needs and further their objectives at different levels of activity. One of the SiS' major initial objectives was to follow up on the evaluations of individual clients and of the treated population as a whole, and to thereby determine whether the treatments were producing positive results.

It was anticipated that systematic documentation of each client's treatments and responses would facilitate treatment planning and create opportunities for dialogue with clients about their problems and needs. Another key objective was to compile national statistics on client development and to track clients' post-treatment outcomes. On their admission to the special homes, the youths are subjected to a structured interview – ADAD, the Adolescent Drug Abuse Diagnosis (Friedman & Utada, 1989). The interview provides information on their current situation and on various problems that may be encountered by adolescents. The adolescents' responses also provide information on their investment in the process, their backgrounds, and their treatment histories. The ADAD instrument thus provides extensive insights into the mindset of the adolescent. As such, it is best used at an early stage in the investigation process, to identify risk areas that require further examination (Söderholm Carpelan & Hermodsson, 2004).

In 2008, 1437 young people in Sweden aged between 10 and 21 were admitted to special youth homes; on average, approximately 1000 are admitted every year. Thirty-six percent of those admitted in 2008 were girls.

Forty-two percent were 15 or younger, forty percent were aged between 16 and 17, and eighteen percent were 18 or older. Half of the youths had a Swedish background, i.e. both their parents were born in Sweden. More than half had previously been admitted to a treatment institution. Forty-one percent of the girls and sixteen percent of the boys reported that their mothers had psychological problems. (SiS, 2008).

The young people detained at special youth homes are often in extremely precarious situations, which often involve substance abuse, crime, or other socially-deviant behaviour. Many of these youths have had difficult childhoods, and their relationships with their parents and other intimates are often characterized by instability and insecurity. Many also have psychological problems and/or limited academic knowledge, typically as a result of poor school attendance. Several authors (Armelius et. al. 1996; Friedman & Utada, 1989; Sarnecki, 1996; Stenström & Söderholm Carpelan, 1996; Bukstein, 1995) have confirmed that antisocial adolescents' problem profiles are complex and multifaceted. Extensive research has shown that youths who are admitted to institutional care typically have numerous problems relating to things such as school, family, crime, and drug abuse (Sarnecki, 1996).

The ADAD interview is an instrument that provides useful information on youths with multiple and complex problems. In light of the increasing emphasis on knowledge-based care and treatment in social work (Söderholm Carpelan & Hermodsson, 2004), ADAD was adopted at Sweden's special youth homes in 1997. It was intended that ADAD would be used both as a source of data for creating tailored treatment plans and as a tool for monitoring the treatment's effects. Thus, information obtained via the ADAD would be used to clarify the young person's problem profile and to customize their care and treatment to suit the needs identified (Söderholm Carpelan & Hermodsson, 2004).

The ADAD is currently in widespread use in the US, Australia, and various European countries. However, there have been no studies on the psychometric properties of its Swedish version, which is used in various contexts including SiS treatment units, private practice, and in the treatment of adolescents by social workers. Adolescents entering special youth homes are routinely asked to participate in an ADAD interview. Between the introduction of this policy and March 2010, between 600 and 850 adolescents have been interviewed each year in this context. The SiS research registry currently contains approximately 9 600 registration

interviews, 8 500 discharge interviews and 1 500 follow-up interviews. Follow-up interviews are conducted one year after the individual's discharge from the special youth home (SiS, 2010).

Compared with the ASI (Addiction Severity Index), which is a similar instrument designed for adults (McLellan et.al. 1992), ADAD is much less widely used in the municipal social services. However, some of Sweden's largest municipalities such as Umeå, Jönköping, Lund, Sundsvall and Norrköping have begun to implement the interview in their treatment of adolescents. Today, the ADAD interview is used as a source of data for treatment planning and follow-up in approximately 30-40 private institutions that care for young people with social and drug problems (Söderholm Carpelan & Hermodsson, 2004).

Approximately 43 Swedish institutions use a computerized version of ADAD (ADADnet), which is hosted by Rabe and Kobberstad AB. This company's central database contains details of more than 300 ADAD interviews. Four units - Jönköping, Trelleborg, Sundsvall and Norrköping - run their own versions of ADADnet and are also likely to have databases containing a relatively large number of interviews. However, the largest ADAD data set in Sweden is probably that maintained by the SiS, which publishes preliminary results from the basic interview in various annual reports.

Since the implementation of ADAD in 1997, a shortened version called the European Adolescent Assessment Dialogue (EuroADAD) (Friedman, Terras, Öberg & Haack, 2002) has been tested in several European countries including Sweden. This version has reduced coverage of some problems and a small amount of items have been added (Söderholm Carpelan & Hermodsson, 2004).

Another important use of ADAD data is in the evaluation of treatment programs and research. Some large ADAD-based studies have been conducted in Sweden, which are briefly discussed below.

- 1) A study of the weighting of specific problems in girls and their prognosis. Girls detained at special youth homes have very heterogeneous problem profiles, but six distinct groups were identified by cluster analysis. Four of these profiles involved explicit abuse, but this abuse varied in nature and in terms of its coincidence with other problems (Berg, 2002).

- 2) A study of differences in self-reported criminal behavior between young people in care and school children (Eriksson, 2004). Youths in care

facilities in Sweden were found to present a variety of problems but were not necessarily both involved in crime and deficient in resources.

3) A study on the use of ADAD in treatment planning. It was found that ADAD text summaries and severity ratings facilitate the process of treatment planning. Models for treatment planning have been developed at several institutions (Jansson, 2000).

4) Statistical studies on ADAD data (Dahl, 2003; Hagberg, 2003, Jansson, 1999).

5) A study using the ADAD in a normal population in Umeå (Börjesson & Ruthström Scott, 2000).

6) ADAD has been used to gather data on risky alcohol use, peer and family relationships and legal involvement in adolescents with antisocial problems. The general risk factors for alcohol abuse in adolescents aged between 12 and 18 were found to be leisure and peer problems, problems associated with family background and relationships, and criminal behavior (Ybrandt, 2010).

7) ADAD has been used to examine psychological and social problems in antisocial adolescents with mental health problems admitted to special youth homes. The adolescents were found to have both externalizing and internalizing problems. While significant improvements were achieved with respect to the externalizing problems, the same was not true for their mental health problems (Als fjell & Stenberg, 2008).

The results of some studies using the ADAD interview elsewhere in Europe have been published in international forums (Bernard, et al., 2005; Bolognini et al., 2001; Chinet, et al., 2005). In addition, Friedman has conducted a number of research projects using the ADAD interview (Friedman et al. 1993; Friedman et al. 1994; Friedman et al. 1998; Friedman et al. 1999), and Chinet, et al. (2006) used it to explore the relationship between depression and abuse in adolescents with substance abuse problems. However, despite its extensive use, the number of studies using the ADAD interview whose results have been reported in international publications is rather small.

The ADAD interview

The ADAD is multidimensional substance use evaluation instrument. It is designed as a structured interview containing 150 items and sub-items, and provides information on nine distinct problem areas that are considered or

known to be associated with substance abuse. Specifically, it assesses problem severity in the following areas: Medical, School, Employment, Social, Family, Psychological, Legal, Alcohol, and Drugs (Friedman & Utada, 1989).

Development of the ADAD

The ADAD derives from the Addiction Severity index (ASI) which has proven to be a good and reliable instrument for defining problem profiles and evaluating treatment initiatives within the misuse area (McLellan et.al. 1992). The ASI was designed for evaluating adult drug abusers aged 19 or above, whereas the ADAD was designed for evaluating adolescents aged between 12 and 21. It was intended to be a generally useful tool for studying and treating substance use, being suitable for assessment and diagnosis, treatment planning and evaluation, and for conducting research into adolescent drug abuse (Friedman & Utada, 1989).

The decision to focus ADAD on nine problems areas was made on the basis of the constructors' experience in conducting large scale studies on adolescent substance abuse. The constructor of the ASI served as a consultant during the development of the ADAD. The final ADAD items were selected from five sources that provided a very large, multifaceted item pool. The largest initial group of items was drawn from interview instruments developed by Friedman et al. (1989) for previous studies on adolescents' use and abuse of drugs. In several previous studies, these items had proven to be effective either in distinguishing between drug users and non-drug users, to be correlated with the severity of drug use or drug use lifestyle, or to predict to the outcome of treatment for adolescent drug abuse. The format model for the ADAD was the ASI, and research on ASI items was used in the development of similar ADAD items tailored to the assessment of adolescents. Additional ADAD items and content categories that could potentially be expanded into "problem areas" were identified by reviewing other previously-established instruments. New items were created to provide information on content areas that the creators and their collaborating researchers and clinicians considered important in assessment. Importantly, an open dialogue was maintained between the creators and various adolescent drug treatment service providers during the development of the item pool (Friedman & Utada, 1989).

During the final stages of its development, a preliminary version of the ADAD was administered to 191 adolescents on their admission to various outpatient, residential and inpatient drug programs. A series of correlation and factor analyses were conducted on the dataset so obtained, and each of the instrument's items was correlated with the ISR (Interviewer Severity Rating) for the relevant problem area. Items that were not strongly correlated with the ISR were generally excluded. A separate varimax rotation factor analysis was conducted on the items for each of the nine problem areas; items that were not found to load to a substantial degree on any factor were put up for elimination (Friedman & Utada, 1989).

Table 1 provides an overview of the problem areas examined in the ADAD interview.

Table 1. The nine problem areas examined in the ADAD interview.

1. Medical	Relates to the adolescent's need for medical treatment and provides information on possible chronic problems and medication. These items take the form of a checklist of common medical problems.
2. School	Features items that provide data on the adolescent's education, current school state, and possible school problems.
3. Employment	Provides information about the subject's work experience and current work situation.
4. Social	The items concern relationships and potential conflicts with friends and persons of the opposite gender.
5. Family	Items relating to the quality of the adolescent's family relations and problems. Responses provide information on family conflicts, the adolescent's behaviour at home, and the positive and negative roles they fulfil in the family.
6. Psychological	Includes both a checklist of common adolescent psychological and emotional reactions and symptoms and an assessment of current and

	previous psychiatric status in terms of the most common diagnostic categories.
7. Legal	Involvement in crime, now and previously; includes a checklist of various crime types.
8. Alcohol	Includes questions on when the subject first began consuming alcohol, their consumption habits, and any alcohol-related problems they may have had.
9. Drugs	Items relating to the subject's current frequency of drug use, extent of current multiple substance use, amount of money currently spent on drugs and several items on the social context of their use.

The ADAD is a structured questionnaire and consists mainly of items with fixed response alternatives within the nine different problem areas. It contains dichotomous, categorical and interval items. Both the interviewer and the subject are required to provide an estimate of the amount of help needed in each problem area. The adolescents are also asked to express their level of concern over their problems in each area (Friedman & Utada, 1989).

Outcomes

The ADAD produces three sets of outcomes: interviewer severity ratings, adolescent severity ratings, and composite scores. The 150 pre-coded items of the ADAD allow for both qualitative and quantitative analyses. The responses to the ADAD are assessed using three subjective severity ratings, made by both the subjects and the interviewers for each problem area. These are: a) the adolescents' rating of the severity of their own problems, b) the adolescents' rating of their need for help; and c) the interviewer's rating of the severity of the subject's need for treatment (Friedman & Utada, 1989).

Interviewer severity ratings

The interviewer severity rating is determined after the interview and provides an overall assessment of the young person's problems in each

problem area. The severity ratings for the nine problem areas are primarily intended to aid in investigation and treatment. In order to correctly administer the interview and assign severity ratings, interviewers must undergo supervised training (Friedman & Utada, 1989). Together, the interviewer severity ratings (ISR) for each problem area constitute a comprehensive adolescent life problem profile. ISR are subjective judgments made by trained interviewers using both objective and subjective information collected in the interview. They are determined using a two-step method. First, the interviewer narrows the initial severity rating down to within a two-point range on a 10-point scale ranging from 0 (no real problem) to 9 (an extreme problem) based on specific items in each problem area. Second, the interviewer incorporates the adolescent's own perception of problems and needs, choosing the higher or lower of the two values on the basis of the adolescent's rating (Friedman & Utada, 1989). The interviewer must take all of the subject's responses to items within a single problem area into account, considering the extent of the problems, whether the problems have arisen over the last 30 days or have existed for a long time, and whether the problems are acute or chronic in nature. Emphasis should be placed on the critical items of the ADAD (ADAD-manual, 2010).

Adolescent severity ratings

The adolescent rating scale consists of two items which are located at the end of each problem area. The rating is based on the subject's current situation, i.e. their experiences over the last 30 days. The purpose of these items is to provide information on how troubled the adolescent has been by the types of problems identified by the ADAD and on their desire for treatment for those problems. The adolescent rating (AR) ranges from 0 (no problem) to 3 (a lot of problems) (Friedman & Utada, 1989).

Mathematically derived composite scores

For each problem area in the ADAD, a multi-item composite score (CS) representing the severity of problem over the past 30 days is generated. The CS are measures of degree of severity of the adolescent's problem status at a given time and can be used to assess changes in problem severity over time,

which can be useful in studies of the effects of intervention and treatment programs (Friedman & Utada, 1989). The different ADAD CS have different ranges, and so each CS must be considered separately (Chinet et al. 2007).

The construction of CS makes them more useful for evaluating changes than the ISR because they are comparatively independent of the interviewer's clinical judgment of the "severity" of each life problem area and because they incorporate the adolescent's self-ratings of the severity of their problems and need for help (Friedman & Utada, 1989). CS are computed for eight (Medical, School, Social, Family, Psychological, Legal, Alcohol and Drugs) of the nine ADAD problem areas. There is no CS for the Employment problem area because most adolescents are in school and not seeking employment (Friedman & Utada, 1995). The CS are a source of objective social and cultural information on youth behaviour. They are calculated by summing weighted and unweighted items selected by clinicians and researchers for each problem area, and also incorporate the two ratings provided by adolescent at the end of each problem area; the precise weighting of each item is tailored to each individual subject's circumstances. Another decisive factor that is included in the composite formula is the extent to which items within a certain problem area can be shown to load on the same factor. The CS are constructed by summing the response scores for the chosen items and by recoding and/or weighting certain items. In order to be used in a formula which produces a measure of problem severity, an inversion of items yielding positive information of their numerical value was required (Friedman & Utada, 1989).

The weighting of the items is decided by a team of three researchers and clinicians, who discuss the clinical importance of each item for the subject during the 30-day period leading up to the day of the assessment and their correlation with the ISR (Friedman & Utada, 1989). The strength of the correlation between individual items and the ISR for the relevant problem area is also considered. The higher the correlation, the more significant the item is considered to be, and thus the greater its weighting when calculating the composite score. The CS is calculated from items that have been selected to represent the adolescent's overt behaviour and performance rather than their judgments, attitudes, opinions, reactions or judgments (Friedman & Utada, 1995). For example, the CS for alcohol-related problems is calculated on the basis of the frequency with which the subject consumed alcohol over the last 30 days, the number of drinks consumed per day, the frequency of intoxication, the amount of money spent on alcohol, the number of the

adolescent's who also drink alcohol, and the extent to which the adolescent is troubled by their consumption and their desire for help (Jansson, 1999).

Some problems with the construction of the CS have been identified (Jansson, 1999). First, there are problems with the items considered when calculating the CS. The number of items incorporated into each CS varies across different problem areas; the Medical and School problem areas include only six, whereas the Family area is calculated using eleven. If the checklists within the CS are counted as separate items, the number in each CS ranges from seven (for the Alcohol problem area) to 51 (for the Psychological problem area). Because of this variation, it is easier to get high scores on some CS than on others. An additional problem is the nature of the items; it is easier to get a high CS in the Medical problem area than in the Drug problem area, for which a subject must use multiple different drugs every day to get a high score. Additionally, some of the items used in the construction of the CS for the Medical problem area are only relevant to female subjects. Consequently, the average CS for girls in the Medical problem area (20.3) is greater than that for boys (19.3), making it impossible to perform meaningful cross-gender comparisons (Jansson, 1999). Only individuals with extremely numerous and severe problems will have high CS in the Psychological and Drug problem areas, and so the distributions of scores for these areas can easily become quite lopsided; it is almost impossible for even a profoundly troubled individual to get the maximum score in either of these areas. This could result in the underestimation of adolescents' problems. There are also difficulties with some other areas. Notably, a maximum value for the Legal CS cannot be defined (Jansson, 1999). There are thus some problems with the items that are used in the calculation of the CS.

Second, there are some problems with the coding system used for some of the critical items within the CS. For example, the coding system makes it possible to obtain a negative CS for the School problem area. Moreover, the coding system used in some problem areas creates issues relating to the range of the calculated CS. For example, the coding of some of the critical items used to calculate the Alcohol CS is such that the range of values spanned by this CS is comparatively small. This can make it difficult to use this CS to distinguish between normal adolescents and those with antisocial problems, which might compromise its validity (Jansson, 1999).

Finally, there are some problems with the weighting of the critical items. For example in the Medical problem area, AIDS is assigned the same

weighting as sleeping problems, despite the obvious differences in the challenges they present. In the School problem area, adolescents who have left school are automatically given a composite score of 26. The manual provides no justification for the selection of this score, which was probably based on the creators' assessment of American conditions and may thus be unsuitable for use in Sweden (Jansson, 1999). The CS probably does not adequately measure the severity of school problems. There is thus a risk of underestimating the severity of subjects' problems in the Medical and School problem areas.

Critical items

Eighty-three of the items in the ADAD questionnaire are marked with an asterisk; these items are referred to as critical items. On the basis of their clinical work with adolescents, Friedman and Utada (1989) consider the critical items to be particularly significant. Ten of the 51 items in the psychological status and problem checklist (PPCL) are marked as CI; the responses to these items form the cornerstone of the interviewer's evaluation of the severity of the adolescent's problems. The interviewers should place special emphasis on the critical items when making their severity ratings.

Problem status checklists

A key feature of ADAD is its incorporation of four problem checklists in the Medical, School, Family and Psychological problem areas. These checklists, which require yes or no responses from the adolescent, enable the interviewer to gather a substantial amount of information on the subject in an easy and efficient manner. The items of the problem checklists were selected from longer lists of items from an open-ended instrument that had been administered to several different populations of adolescent substance users. The items that were found to be most useful in predicting treatment outcomes were incorporated into the ADAD (Winters, 1999).

In study III reported in this thesis, particular emphasis was placed on the PPCL. The checklist that was used featured 49 items relating to common psychological and emotional reactions and symptoms in adolescents,

including an overview of the subject's psychiatric history in terms of the most common diagnostic categories, such as anxiety, depression, hallucinogen consumption, etc. Two items, the number of suicide attempts and the number of days spent in hospital days, were excluded because they are qualitatively different to the others; items focusing on events that took place in the 30 days immediately prior to the interview were also excluded, to maintain focus on the subject's psychiatric history rather than their current state of mind.

Table 2 provides an overview of the questions, the critical items and the composite scores of the ADAD interview.

Table 2. Overview of the questions of the ADAD interview.

Questions		Critical items (Total items)	Example of questions	Composite score Total items (Max value)	Example of questions
Medical	Adolescent's need for medical treatment and information about possible chronic problems and medication. Checklist over common medical problems	4	Do you have any chronic problems? How many times in your life have you been hospitalized overnight for medical problems?	6 (20; 3 girls/19; 3 boys)	Are you often sick? How would you rate your overall physical health? How many days in the past 30 have you experienced medical problems?
School	Items about education, current school state and possible school problems	7	Have you ever repeated a grade? How many times were you suspended from school?	6 (31)	How were your grades during the past school year? How many of those absences were due to being truant from school?
Social	Items concern relationships with friends, possible conflict and whether the adolescent has any conflicts with persons of the opposite gender	8	Are you satisfied with your social life? How many days of the past month have you had a (serious) problem with close friends?	5 (30)	How much of your free or leisure time do you spend with the friends who use drugs? How often did you engage in partying during the past month?
Family	Items about the quality of the adolescent's family relations and problems. Information about family conflicts, the positive and negative roles and behaviour the adolescent enacts in the home	7	How difficult do you find it to talk to your mother about things that bother you? How much do you feel you can rely on what your mother tells you?	11 (44)	How much conflict is there in your family? How satisfied are you with how well you get along with your family?
Psychological	Includes both a checklist of common adolescent psychological and emotional reactions and symptoms and an assessment of both current and lifetime psychiatric status in terms of the most common diagnostic categories.	12	Feel like injuring yourself, feel like something is wrong with your mind, have thoughts of ending your life, experiences serious depression	7 (56; 3)	How many days in the past 30 have you experienced any psychological or emotional problems? At time of this interview, is the client obviously depressed/withdrawn?
Legal	Involvement in crime, now and previously. A checklist of various kinds of crime is included.	14	Are you on probation or parole? How many days in the past 30 have you been involved in illegal activities?	7 (no max. value)	How many times in the past 3 months have you been locked up or detained? How many days in the past 30 have you engaged in illegal activities?
Alcohol	Debut, alcohol habits and possible problems associated with alcohol.	5	How many times have you gotten drunk in the past month?	7 (47)	How much money would you say you spent during the past 30 days? How much did you usually drink per day in the past month on the days you drank alcohol?
Drugs	Items about current frequency of drug use, extent of current multiple substance use, amount of money currently spent on drugs and several items on the social context of use.	4	Did you ever find that you need larger and larger amounts of a particular drug to get high? Have you ever tried to cut down on any drugs but found you couldn't do it?	8 (242)	How many days have you used more than one substance in the past month? Have you used drugs in or during school within the past month?

American and Swiss studies on the psychometric properties of ADAD

To date, two studies have investigated the psychometrics properties of the ADAD interview. An American study was conducted by the developers of the interview, Friedman and Utada (1989) and a Swiss study was undertaken by Bolognini et al. (2001).

In the American study, Friedman and Utada (1989) examined the reliability and validity of the American version of ADAD. Their sample consisted of 1042 patients admitted to six outpatient programs (n=683), three residential non-hospital programs (n=157), and three hospital programs (n=202). The subjects' mean age was 15.6 years (S.D= 1.5). Interrater reliability was examined in two different ways.

The first method involved an experienced research psychologist who was familiar with the ADAD instrument alternating with a research interviewer with limited prior experience with ADAD in conducting the interviews. In the interview setting, one of the two conducted the interview while the other observed, and the responses to all items as well as the ISR for each of the nine problem areas were recorded independently. A total of eighteen interviews were evaluated. Correlations between the two ratings ranged from .85 for the Social problem area to .97 for the Medical problem area (N = 18). The stability of ADAD was evaluated using a repeat measure taken after 3-6 days, with the same eighteen persons being interviewed again. The results showed good test-retest reliability. The Pearson's r values for the CS varied from .92 for the Medical problem area to .99 for the Alcohol and Drug problem area. For the ISR, Pearson's r ranged from .84 for the Social problem area to .95 for the Medical and Alcohol problem area.

The second method for examining interrater reliability involved an assessment by multiple raters, who made independent severity ratings for each of two client-subjects. Seven raters observed the interview of the first subject through a one-way mirror, and nineteen raters observed a videotaped interview of the second subject. The first group of raters had received an hour of training on the ADAD, while the second had received two hours of instruction on the interview. Friedman and Utada (1989) combined the results for the ISR of the two subjects and then calculated a percentage for the level of agreement within one point in either direction of the modal rating. The results showed a good level of agreement between the twenty-six raters. This level varied from 69% for the Employment and Legal problem

areas to 96% for the Medical problem area. Friedman and Utada concluded that ADAD is a reliable interview for the assessment of adolescents' problems.

The items in the different problem areas are not intended to measure the same thing but the items included in the CS in each area are intended to be homogeneous and to measure similar factors. Friedman and Utada (1989) therefore chose to examine the internal consistency of the CS for each problem area of ADAD by computing the intercorrelation between the items within the CS. Cronbach's alpha values ($N = 1042$) for the nine areas were found to range from .66 for the Social problem area to .85 for the Family problem area. Friedman and Utada (1989) examined three aspects of validity: intercorrelations between the ISR, intercorrelations between the various CS, and correlations between the ISR and the CS. They found that intercorrelations between the ISR were low except for those between the Family and Psychological problem areas and between the Family and Social problem areas. Intercorrelations between CS were also found to be rather low except for those between the Family and Psychological problem areas and between the Drug use and Legal problem areas. The highest intercorrelation between the ISR and the CS occurred in the Psychological problem area ($r = .67$); the lowest was for the Social problem area ($r = .30$). According to Friedman and Utada, this relatively poor correlation for the Social problem area is unsurprising because in this case the CS is based only on one type of social behaviour whereas the ISR is based on all items in that section of the ADAD interview, which also covers other types of social problems.

In a Swiss study, Bolognini et al. (2001) examined the reliability and validity of the French version of the ADAD interview. Their sample consisted of 102 adolescents (66 boys and 36 girls) aged between 13 and 19 who had used at least one type of drug once per week over the course of the three months directly preceding the interview. The interviews were conducted by experienced psychologists. In order to calculate interrater reliability, six interviews were audio-taped. Five independent interviewers listened to these interviews and rated the adolescents' need for help. As was found in the American study, the Swiss study showed good levels of agreement between the different raters, varying from 63% for the Medical problem area to 93% for the Drug problem area. As expected, expressing the agreement values in terms of Cohen's kappa caused the agreement values to fall, with the new values ranging from .19 for the Medical problem area to

.79 for the Drug problem area. The results regarding internal consistency were also similar to those from the American study. All of the calculated Cronbach's alpha values were high, peaking at .87 for the Family problem area. The sole exception was the Social problem area, for which Cronbach's alpha took a value of .47. The only intercorrelations considered in the Swiss study were those between the ISR and the CS. All of the correlations were found to be significant, with the weakest observed correlations being those between the Social and Legal problem areas. The Swiss study had some notable limitations: the sample was small and consisted of adolescents with severe drug problems and regular drug users with few other problems; it was therefore not representative of the wider population and so the generalizability of the findings is limited. The value of such studies can be maximised by exploring the psychometric properties of a diverse group of adolescents.

The American and the French version of ADAD have thus been thoroughly examined and tested, and were shown to be highly reliable in terms of validity and of interrater reliability and the internal consistency of the CS (Friedman & Utada, 1989, Bolognini et al. 2001).

The importance of evidence-based practice

Modern society tends to emphasize the importance of having a scientific basis for legitimizing of various social practices (Bergmark, 2005). The importance of evidence has been stressed for a long time throughout medical history. In recent years, social work has also adopted a similar approach, demanding that knowledge should derive from evidence based practice (Socialstyrelsen, 2000; Söderholm Carpelan & Hermodsson 2004). Evidence-based social work is characterized by the development of guidelines, summaries of the effects of interventions, implementation of validated tools designed for client assessment, and the development of assessment systems. This requires a clear and effective relationship between research and practice, but also demands that existing research be evaluated so that only data from studies that satisfy these requirements are used (Reynolds, 2000).

In Sweden, the IMS (Institute for the development of Methods in Social work) has played a major role in the development of evidence-based practice. There is increasing demand for evidence in numerous areas,

including efforts related to both the prevention and treatment of alcohol and drug abuse in adolescents. The standardization of evaluation instruments is one of the key goals of evidence-based practices (SOU, 2008). Evidence-based-practice is based on a combination of user's experiences, professional expertise and the best available research and science (SOU, 2008). Within the National Board of Institutional Care (SiS) the ADAD is used to obtain data on young people in special youth homes, with the objective of ensuring coherence between institutions.

There is a need to improve care for adolescents and to move towards evidence-based treatment of adolescents with social and psychological problems. This will require the development of systematic measuring instruments that will provide a sound basis for making decisions related to the treatment of adolescents, and for following up on and documenting the effects of treatments. The national social services board has stressed the importance of evidence-based instruments (Socialstyrelsen, 2006), and has recommended a set of quality criteria for behavioral testing instruments used in Sweden. These are: there should be a *Swedish version* of the instrument with a *Swedish manual* explaining how it should be scored, evaluated, and administered; the instrument must exhibit satisfactory *reliability* and *validity*; and *Swedish standards or benchmarks* that are representative for the general population should be available (SOU, 2008). In light of these requirements, it was deemed important to evaluate the reliability and validity of the Swedish ADAD. Psychometric properties such as the reliability and validity of an instrument can be evaluated in many different ways.

Psychometric concepts

The following sections discuss selected different concepts relating to reliability and validity that are used in this thesis.

Reliability

Reliability is a quantitative measure of the accuracy or consistency of a test score or instrument (Brennan, 2006). When an instrument is administered, one would like some guarantee that the results obtained would be reproduced if the same individuals were re-tested under similar conditions.

That is to say, a test is reliable if it generates similar scores even when variables that should ideally be extraneous, such as the identity of the evaluator or the circumstances under which the test is conducted, are changed. Reliability is the degree to which individuals' deviation scores remain consistent over repeated administrations of the same test (Crocker & Algina, 1986).

Error is present to some degree in all psychological measurements. Errors may be either random or systematic. Systematic errors have consistent effects on an individual's score and stem from some trait of the person or the test that has nothing to do with the construct being measured. In contrast, random errors have unpredictable effects on individuals' scores and stem from chance happenings. Both systematic and random errors affect the interpretation of scores. Systematic errors do not give rise to inconsistencies between tests, but may affect the accuracy and the practical utility of the test scores. Random errors reduce both the consistency and the usefulness of the test scores (Crocker & Algina, 1986).

It is important for the test developer to identify the types of measurement errors. A variety of methods can be used to collect and analyze data when assessing reliability.

Internal consistency is relevant to measurements that consist of multiple items that are summarized into a composite score. Clinical assumptions made on the basis of a composite score calculated from the subject's responses to multiple items are strengthened by evidence that all of the items in question measure the same construct. Internal consistency refers to inter-item reliability and is a measure of the degree of consistency between the items in a scale. Cronbach's alpha is a test of internal consistency that measures reliability across items in a single test. It is used to estimate the reliability of a composite when the composite score variance and the covariances among its components is known (Crocker & Algina, 1986). Internal consistency can be described as an estimate of reliability based on the average correlation between the questions in a scale. Cronbach's alpha is a function of both the average correlation between each question and the number of questions; the alpha value increases if any of these parameters increases. Theoretically, if the questions are uncorrelated, the alpha is 0 and if all questions are identical the alpha is 1 (Nunnally & Bernstein, 1994).

Interrater reliability refers to the extent of agreement between different raters, and is tested by having two or more different raters independently observe and record specified behaviors during the same time period and

studying the consistency of the different raters' observations (Crocker & Algina, 2008). To obtain a satisfactory interrater reliability in something like the ADAD interviewer severity rating, the estimation process must be formalized and explicit and the assessors must have been trained in the technique (Kline, 2000). Different statistical methods can be used to explore the interrater reliability. These methods are described in the following text. Both unweighted and weighted kappa analysis are used to explore the conformance between variables; for ordinal scales, weighted kappa values are preferred (Siegel & Castellan, 1988). Cohen's Kappa analysis measures the amount of agreement on the diagonal in the frequency table and the amount of agreement related to chance. The weighting in the weighted Kappa analyses is designed to take into account the magnitude of any deviations from the diagonal. Kappa coefficients of .20 or less are considered indicative of poor agreement, coefficients of .21 - .40 indicate fair agreement, and values between .41 and .60 indicate moderate agreement. A kappa coefficient between .61 and .80 reflects good agreement, while values > .81 reflect excellent agreement (Landis & Koch, 1977). Two other measures of the interrater reliability are Pearson's correlation coefficient and the percent agreement between raters. In contrast to the Kappa analysis, these two measurements do not account for chance.

Validity

The term validity refer to the utility of an instrument, i.e. how well the instrument measures what it is suppose to measure (Nunnally & Bernstein, 1994). The terms "validation" and, to a lesser extent, "validity" have two distinct but closely related usages when discussing of measurement. In the first sense, "validation" refers to the process of seeking evidence to support the proposed interpretations and uses; in this context, to validate an interpretation or use is to show that it is justified. In the second sense, "validation" refers to evaluating the extent to which the proposed interpretation and uses are plausible and appropriate. In this sense, to validate an interpretation or use is to evaluate its overall plausibility. The first usage implies an active role in building a case for the validity of a proposed interpretation. The second usage implies a more-or-less objective appraisal of the evidence (Brennan, 2006).

The most important types of validity are discussed individually.

Construct validity. All sciences are concerned with identifying functional relationships between important variables. Psychological constructs are not directly observable. They are defined in theory through the existence of specific relationships between measures of the construct in question and measures of other constructs in the theoretical system as well as measures of specific real-world criteria. The meaningfulness or importance of the construct must be made clear by describing its relationships to other variables. Construct validation requires sets of multiple types of evidence, which can be obtained by examining correlations between test scores and selected criterion variables, differentiation between groups, factor analyses, or multitrait-multimethod matrices (Crocker & Algina, 1986).

Criterion validity is a measure of a test's validity that is based on comparing its scores to some other criterion that has already been established as being valid. Criterion validity is generally expressed in terms of the correlation between the test and the criterion measurement. This correlation coefficient is referred to as a validity coefficient. The closer the correlation coefficient is to +1.00, the stronger the criterion-related validity. Criterion validity can be divided into two types of validity: concurrent and predictive. *Concurrent validity* refers to the correlation between test scores and criterion measurements made at the time the test was given, while *predictive validity* attempts to demonstrate a correlation with future behavior. Both concurrent and predictive validities are established by deciding the proper level of validity coefficient or correlation between a test score and some criterion variable. (Crocker & Algina, 1986). In practice, the predictive validity is most important when seeking to determine whether a psychometric structure is durable.

SUBJECTS AND METHODS

Participants

The same groups of participants were used in studies I and II. The participants in the normal group were adolescents registered as residents in Umeå. A total of 335 dispatches were required in order to obtain a sample of 121 normal adolescents. The total loss was 43 %, with the greatest loss occurring among 17-year-old boys. The participants with antisocial problems were interviewed by personnel in 1997 and 1998 while detained at

special youth homes. This database was organized and placed at the disposal of the study by the National Board of Institutional Care. Study III focused on a group of 31 adolescents with antisocial problems.

The table below summarizes the characteristics of the group of normal adolescents and the groups of adolescents with antisocial problems in study I, II and III.

Table 3. Demographics and other characteristics of the normal adolescents and those with antisocial problems (Groups I and II).

	Normal group N = 121	Group I N = 1168	Group II N = 31
Background (%)			
Born in Sweden	94	76	84
Adopted	5	6	3
Adolescents			
<i>Mean age (range)</i>	16.0 (15-17)	16.1 (10-21)	15.2 (12-19)
Girls	16.0 (15-17)	16.1 (12-21)	15.3 (12-19)
Boys	16.0 (15-17)	16.1 (10-21)	15.1 (13-17)
<i>Gender (%)</i>			
Girls	51	30	45
Boys	49	70	55
<i>Living arrangement (%) (recently lived with)</i>			
Both parents	68	26	33
Single parent	17	44	53
Single/other custodian	15	1	12
Parents			
<i>Work status (%)</i>			
Employed	90	59	54
Unemployed	2	15	14
Students	3	8	7
Other	6	18	24

Design

Normal adolescent group

Baseline assessment. The ADAD interviews of the participants in the normal adolescent group were conducted between February 2000 and December 2000, during which time all of them were registered residents of Umeå. The staff who interviewed the normal adolescent group consisted of five persons; four professional psychology students whose studies were drawing to a close and one experienced clinical psychologist. All interviewers were women and participated in a one-day training course on how to perform an ADAD interview. The course was given by a psychologist with extensive experience of ADAD interviews. Before the project in Umeå was started each interviewer had to perform two approved test interviews. The Youth Self Report (YSR) and Beck Depression Inventory (BDI) questionnaires were filled out at the end of the session. The normal adolescents received a cinema voucher as compensation for the time spent participating in the interview.

Follow-up assessment. One year after the initial administration of the ADAD interview, sixty of the normal adolescents were contacted again and asked if they wanted to participate in an additional study. Fifty agreed to participate. These individuals were asked to complete the Diagnostic Interview for Children and Adolescents (DICA), administered by the same interviewers who conducted the baseline assessment.

Interrater reliability

Interrater reliability was measured in the normal adolescent group. To facilitate the interrater reliability test, each interview was audio-taped. Forty of the taped interviews were then randomly selected to be rated by another interviewer. Four interviewers listened to ten interviews each and completed the ADAD form and the ISR. Consequently, each interview was judged by two independent interviewers.

Groups of adolescents with antisocial problems

The 1168 participants in Group I were detained under the Swedish Care of Young Persons Act. The ADAD interviews were conducted by personnel during the years of 1997 and 1998 while the adolescents were detained at special youth homes. The database is maintained and was made available to the authors of the studies reported herein by the National Board of Institutional Care (Statens Institutionsstyrelse, 2000).

Baseline assessment. The members of Group II were participating in a project called Psychological problems among adolescents with antisocial behaviour conducted the University of Umeå (Armeliu & Hägglöf, 1998), and comprised 31 adolescents (14 girls and 17 boys) aged between 12 and 19 years ($M = 15.2$, $SD = 1.76$). The adolescents were informed about the project both by the staff at the special youth homes and the project leaders. Their participation was voluntary and contingent upon the receipt of consent from both the adolescent and their parents. The adolescents were given closed envelopes containing 17 questionnaires together with the YSR and BDI, and returned the envelopes with their answers by post. They were rewarded with a cinema ticket for participating. The participation rate for the antisocial adolescent group as a whole was 66 % (60 % for boys and 68 % for girls). Around half of those who did not return completed questionnaires did so by choice; the others were unable to because of their psychiatric condition or inability to understand the questions. The ADAD interview was administered using a database that was maintained and made available to the researchers by the National Board of Institutional Care (Statens Institutionsstyrelse, 2000).

Follow-up assessment. Follow-up assessments included the YSR and the BDI. These were administered by the research team three years after the initial data-gathering exercise.

Instruments

ADAD

This thesis describes studies on the reliability and validity of the Swedish version of the ADAD instrument.

The Swedish version of ADAD

The Swedish version of the ADAD was developed to reproduce the original American ADAD interview as closely as possible. Some changes were introduced in the translation from English to Swedish, and some items were added to better fit the target population of young people with an extensive mixture of problems. (Söderholm Carpelan, Hermodsson & Öberg, 1997b). The ADAD places particular emphasis on the 30-day period immediately before the interview. Because young people in the care of the social services are often resident in health facilities, data on this 30 day period is supplemented with information relating to other time periods, such as crimes committed by the subject in the past year and data on their typical monthly alcohol and drug consumption over the same period (Söderholm Carpelan & Hermodsson, 2004). The target group is adolescents with social problems aged between 12 and 21.

Some items that are not present in the original American ADAD were added to the Swedish version. A number of items concerning the subject's socio-economic situation, growth environment, and past care and treatment were added to the background section. Items concerning some common physical symptoms were added to the Medical problem area. The School problem area was augmented with items concerning problems with mathematics, an item providing information on the subject's enjoyment of the different stages of their schooling, and an item concerning special education. Two items were added to the Family problem area, focusing on physical abuse and sexual assault. An item relating to eating disorders was added to the Psychological problem area, and one concerning problems with criminality was added to the Legal problem area. In addition, the various crime classifications were clarified and references to actions that are not criminal in Sweden were removed. Items regarding the number of crimes committed by the subject during the preceding year and the age at which they committed their first crime were added. Finally, items regarding the frequency of substance abuse during a typical month and during the month immediately prior to the subject's incarceration were added to the Alcohol and Drug problem areas, along with an item concerning the age at which the subject first consumed various kinds of drugs.

The changes and additions to the Swedish version of the ADAD were implemented in consultation with Alfred S. Friedman and have been approved by him (Söderholm Carpelan et al. 1997b). A revised version of the

Swedish ADAD was constructed in 2008 for the social services. This version incorporates items designed to improve the instrument's ability to address some specific issues of interest to the social services. The changes were made by the social service in Stockholm in cooperation with the IMS and SiS.

The changes that have been made do not alter the basic structure or the core content of the ADAD interview (ADAD-manual, 2010). The severity ratings and composite scores are calculated in the same way as in the American version, and so results obtained using the two instruments are comparable.

All items from the original ADAD were integrated into the Swedish version, and so international comparisons can be made because all the items included in the original version of the instrument are maintained. However, the addition of new items might indirectly influence the severity ratings. On the other hand, comparisons with the EuroADAD are not possible.

ADAD is primarily used for mapping different areas of life and identifying potential problems in these areas. It provides a holistic picture of the adolescent, but should not be regarded as being sufficient by itself; it must be supplemented with information from other sources (ADAD-manual, 2010.). Söderholm Carpelan & Hermodsson (2004) state that one of the future priorities in the SiS' work with the ADAD is to improve on the follow-up process. The SiS needs to be able to assess adolescents' post-treatment progress. It is also important for the individual special youth homes to be able to obtain follow-up results for their former residents. Statistical measurements that facilitate comparisons between measurements before and after treatment need to be developed.

The ADAD interview process

Correct implementation of the ADAD interview requires that the interviewer be well-acquainted with the interview and its manual and have undergone a special education, which should ideally take place over two days plus a follow-up session. During their training, the prospective interviewer receives a set of guidelines and is trained in interviewing and in the coding and assessment of the results obtained.

At the start of the interview, the interviewer explains the purpose of the exercise. They then briefly describe the various question areas, the number

of questions, and the expected duration of the interview, which may vary from 45 to 90 minutes. The interviewer then explains that all subjects are asked the same questions, and that some of the questions might be considered to touch on sensitive areas. The interviewer should provide the adolescent with motivation to be honest when answering. At the end of each problem area, the interviewer asks the adolescent to provide their own assessment of the severity of their problems in that area and of the amount of treatment they feel they need for those problems. Finally, the interviewer lets the adolescent know who will have access to the interview. (ADAD – Manual 2010).

YSR

The Swedish YSR is a standardized self-report questionnaire for adolescents aged 11 to 18 years. The instrument consists of a checklist that provides self-ratings for 20 competence items that measure the child's participation in hobbies, games, sports, chores, friendship, and activities. The problem section contains 112 items (Achenbach, 1991a). The nine subscales of the YSR total problem scale are Withdrawn, Somatic Complaints, Anxious/Depressed, Social Problems, Thought Problems, Attention Problems, Delinquent Rule-Breaking Behaviors, Aggressive Behaviors, and Self-destructive/Identity Problems. The Withdrawn, Somatic Complaints and Anxious/Depressed subscales together comprise the (rather broad) internalizing dimension, while Delinquent Rule-Breaking Behaviors and Aggressive Behaviors together constitute the externalizing dimension (Achenbach, 1991a). The youth is asked to judge how well each item (e.g., *I am mean to others, I am shy, I feel that I have to be perfect*) describes them now or over the six months. The adolescent is asked to rate each item on a three-point scale; 0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true. YSR has been evaluated on 1,057 American children aged 11 to 18 years and its validity has been found to be acceptable. Test-retest reliability ranged from .47 to .79 and internal consistency ranged from .71 to .95 (Achenbach, 1991a). The YSR has been translated into Swedish and back to English to ensure congruence with the original. In a recent Swedish study, the internal consistency was found to be between .51 and .70 for the narrow-band syndromes and was also good for the two broadband dimensions, Internalizing and Externalizing (Broberg et. al., 2001). In the

present study, only the total score and the mean values of the raw scores along the internalizing/externalizing dimensions were used.

BDI

The BDI consists of 21 groups of symptoms and attitudes related to cognitive, behavioral, affective and somatic components of depression consisting of four statements rated from 0 to 3 in terms of severity. These include things such as feelings of guilt, pessimism, self-contempt, changes in appetite and sleeping patterns and thoughts of suicide. The respondent is asked to select the statement that best describes how he/she felt over the week immediately prior to the test. Cut-off scores are used to evaluate the subject's responses; a total score of <10 indicates no or minimal depression, mild to moderate depression is indicated by scores of 10-16, moderate to severe depression by scores of 17-29, and severe depression by scores of > 30 (Beck et. al., 1988). The psychometric properties of BDI have been shown to be excellent. Its internal consistency has been confirmed by several studies in psychiatric and non-psychiatric samples, with most studies displaying alpha coefficients above 0.75. Studies of its concurrent validity with other self-rating scales have revealed moderate to high correlation coefficients, with means ranging from 0.58 to 0.79. Studies of its differential validity show that the BDI reliably discriminates between depressives and non-depressives (Richter et al., 1998).

DICA

The Swedish translation of DICA was used to determine the incidence of problems. DICA is a structured interview according to DSM-III-R, the Diagnostic and Statistical Manual of Mental Disorders (Herjanic & Reich, 1982). The DICA is a structured diagnostic interview that has been found to have satisfactory test-retest and interrater reliability and good concurrent and discriminant validity (Herjanic & Reich, 1997; Reich, 2000). DICA-based diagnostic scores correspond well with symptom checklist scores (Cerel & Fristad, 2001; Sprafkin, Gadow, Salisbury, Schneider, & Loney, 2002) and other diagnostic interview scores (Teare, Fristad, Weller, Weller, & Salmon, 1998a, 1998b).

Statistical analysis

The psychometric properties of the Swedish language version of ADAD were based on the eight problem areas in the interview (*Study I*). Three measures of the interrater agreement were calculated, focusing on the ISRs: the percentage of agreement between raters, the Pearson product moment correlation coefficient, and Cohen's kappa coefficient (Cohen, 1960). The internal consistency of the eight CS was explored using Cronbach's alpha coefficient (Cronbach, 1951). Concept validity for the problem areas was evaluated using Principal Component Analysis (PCA).

The utility of the CS derived from the ADAD and the incidence of problems associated with their use was studied in the normal adolescent group and in the group of adolescents with antisocial problems. These analyses were based on eight problem areas of the ADAD (*Study II*). All ADAD ISR and CS scales were measured over the range between zero and one (all scales were normalised by dividing the results obtained by the maximum achievable value for each measure) to eliminate difficulties caused by the different scaling of the CS and the ISR when making comparisons. Differences between the mean ISR and CS scores for each problem area within the two adolescent groups were tested using paired *t*-tests. Independent samples *t*-tests were used to test differences between ISR and CS mean scores across the two adolescent groups. Independent samples *t*-tests were also conducted to explore the ability of critical items to differentiate between the two adolescent groups.

Statistically significant differences in the ADAD, BDI and YSR responses for the total group of normal adolescents and adolescents with antisocial problems were identified using the independent *t*-test (*Study III*). The concurrent validity of the ADAD psychological status assessment and problem areas was evaluated using correlations and by comparing the groups' mean scores. The predictive validity of ADAD psychological status and problem areas was evaluated by examining correlations between the subscores of the ADAD and BDI, YSR and DICA scores. Four separate stepwise regression analyses were conducted to find out which of the items in the PPCL make the greatest contribution to the different outcome measures (total YSR score, YSR internalizing and externalizing scores, and BDI).

Data were analyzed using SPSS (Statistical Package for the Social Sciences) version 18.0. The level of significance was set at, $p < .05$ (two-tailed).

THE AIMS OF THE INVESTIGATION

The general aim of the work reported in this thesis was to investigate the psychometric properties of the Swedish version of ADAD in different ways.

SUMMARIES OF THE STUDIES

Participants and method

The samples in all three studies consisted of the three groups of adolescents described in Subject and Methods section of this thesis.

Study I

Börjesson, J., Armelius, B-Å., Östgård-Ybrandt, H. (2007). The Psychometrics Properties of the Swedish Version of the Adolescent Drug Abuse Diagnosis (ADAD). *Nordic Journal of Psychiatry* 61:3, 225-232.

Purpose

Study I evaluated the psychometric properties of ADAD and focused on: 1) reliability in the form of interrater reliability, 2) the internal consistency of the composite scores, 3) concept validity in the form of correlations between different problem areas, 4) an analysis of the levels of correspondence between the problem profiles determined on the basis of interviewer ratings and those calculated on the basis of adolescent ratings or the composite scores, 5) computing the psychometric properties of ADAD in a group of normal adolescents as well as in a group of adolescents with antisocial problems.

Results

The Swedish version of the ADAD in normal adolescents and adolescents with antisocial problems showed good interrater reliability. Three different measures of interrater reliability for the ISR of normal adolescents were examined; the percentage of total agreement between the raters' ranged from .85 to 1.00, the ISR correlations ranged from .39 to .91, and Cohen's kappa (which accounts for the effects of chance) for the ISR ranged from .48 to .84.

The results of the CS correlations using Cronbach's alpha; ranged from .57 to .85 for normal adolescents and from .32 to .84 for adolescents with antisocial problems. The findings yielded moderate internal consistency for the CS of ADAD.

Regarding concept validity, most of the correlations between the ISR scores for each ADAD problem areas were significant for most of the problem areas, and indicated a positive relationship. Intercorrelations across different problem areas were stronger for normal adolescents (.01-.80) than for adolescents with antisocial problems (.01-.48).

A principal component analysis (PCA) was conducted for each group. The results for the ISR of normal adolescents showed that the Legal, Alcohol and Drug problem areas formed one subgroup, while the Medical, Psychological and Family problem areas formed a contrasting subgroup on the second principal component. The Social and School problem areas lay between these two subgroups and are apparently related to both of them. The results are shown in Figure 1.

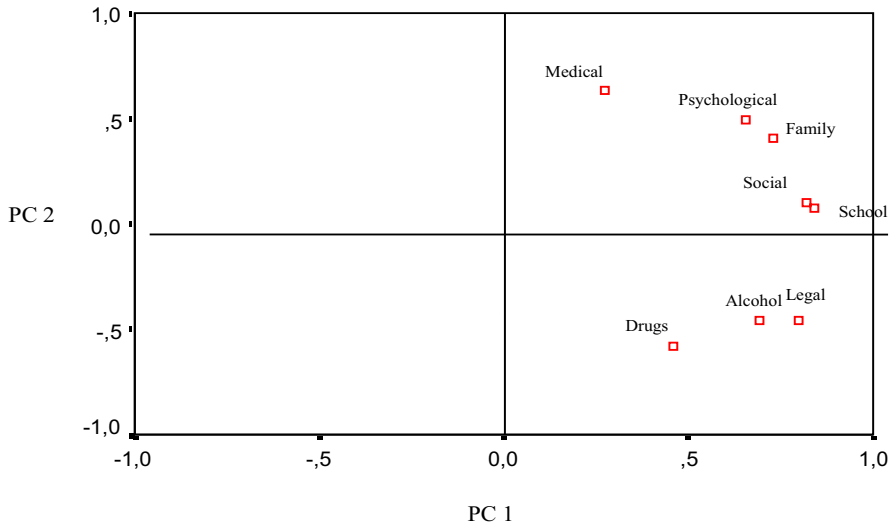


Figure 1. Principal component analysis for the interviewer severity ratings in the normal adolescent group. The axes are the factor loadings for individual variables on component 1 (PC1) and component 2 (PC2).

The principal component analysis for the ISR of adolescents with antisocial problems exhibited results similar to those observed for normal adolescents. However, in this case, the Social problems clustered with Legal, Drugs and Alcohol problems, whereas School problems seemed to belong to the cluster containing Medical, Psychological, and Family problems (Figure 2). Overall, the results were consistent with theory and clinical experience (Ybrandt, 2010).

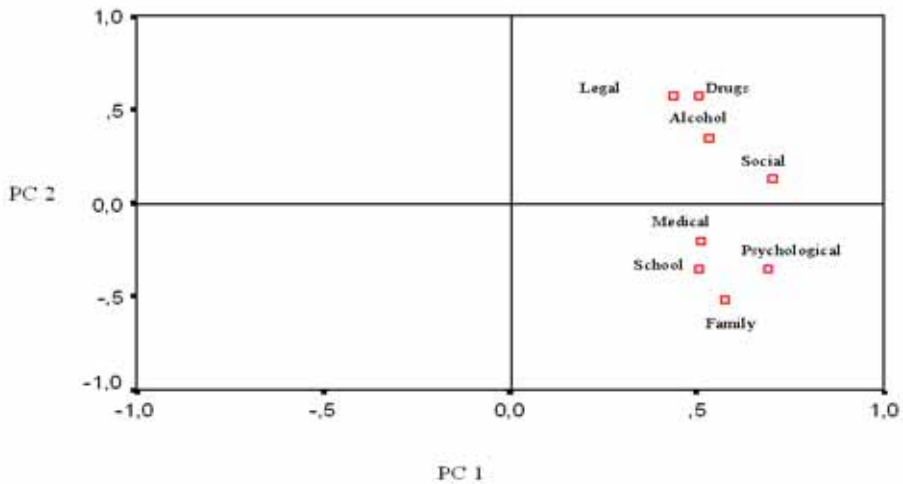


Figure 2. Principal component analysis for the interviewer severity ratings in the group of adolescents with antisocial problems. The axes are the factor loadings for individual variables on component 1 (PC1) and component 2 (PC2).

The results of the levels of correspondence between problem profiles calculated on the basis of ISR, AR and CS showed that for the normal adolescents, the CS gave higher scores than either the ISR or the AR. In the School problem area, the CS score was equal to the ISR score, but the AR score was higher. In the Psychological problems area, all three perspectives coincide. Adolescents with antisocial problems were found to have more severe problems than normal adolescents. In all problem areas, the ISR scores were higher than the CS or AR scores. The AR scores were more similar to the CS than the ISR scores, and were significantly lower than the latter. The CS data suggest that the differences between normal adolescents and those with antisocial problems are relatively small in some of the problem areas, such as Medical, and Alcohol and Drugs, for which other measures indicated larger differences between the groups. For all of the problem areas, the adolescent and the interviewer scores indicated the

difference between normal adolescents and adolescents with antisocial problems to be more substantial than those suggested by the CS.

Conclusions

The ADAD instrument exhibited good interrater reliability; the subscales showed moderate internal consistency, and the concept validity was both satisfactory and comparable to the American and Swiss versions. Finally, meaningful correlations were observed for the ADAD subscales. The Swedish version of the ADAD appears to be a good psychometric instrument for assessing the severity of adolescent problems and their need for treatment. However, the CS need to be reconstructed to be useful in future research.

Study II

Ybrandt, H., Börjesson, J., Armelius, B-Å. (2008). The Adolescent Drug Abuse Diagnosis Composite Scores in Swedish Normal and Antisocial Adolescents. *Substance Use & Misuse* 43:10, 1411-1423.

Purpose

The objective of Study II was to compare two measures of outcomes in the ADAD, the ISR and CS, within and between normal adolescents and adolescents with antisocial problems. The consistency of ISR and CS in the problem areas of ADAD within a normal and a group of adolescents with antisocial problems was investigated, and the utility of the ISR and the CS for the different problem areas in discriminating between groups of normal adolescents and adolescents with antisocial problems was evaluated. An additional objective was to assess the utility of and problems with the CS in ADAD and to clarify issues concerning the inclusion of critical items in the CS, especially in the Medical and Alcohol problem areas, for which the CS exhibited low discriminatory ability.

Results

For normal adolescents, the CS were systematically higher than the ISR. Conversely, for the adolescents with antisocial problems, the opposite was true, with the CS values being lower than the ISR (Figure 3).

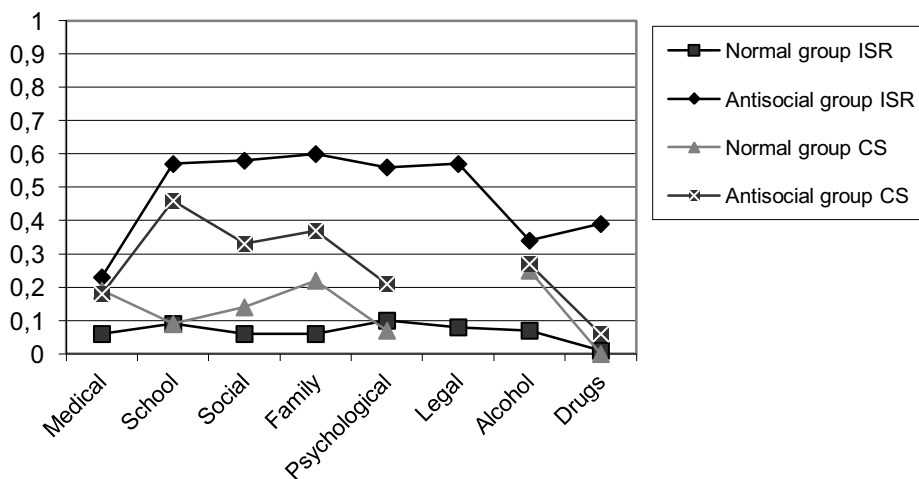


Figure 3. Transformed group means of the ISR and CS for normal adolescents and adolescents with antisocial problems.

For normal adolescents, significant differences between the ISR and CS were identified in five of the seven sections, namely Medical, Social, Family, Psychological, and Alcohol. In the School and Drug sections, the ISR results were similar to the CS. For adolescents with antisocial problems there were significant differences between ISR and CS in all seven sections.

The ISR for the adolescents with antisocial problems were consistently higher than those for normal adolescents in all problem areas. In contrast, there was no difference between the two groups' composite scores in the Medical and Alcohol problem areas.

A series of analyses were conducted to explore the properties of the critical items in the Medical and Alcohol CS. The analyses were conducted separately for the two groups of adolescents, and the same analyses were

performed for both problem areas. Within the alcohol CS, differentiation between the two groups was only achieved by three out of seven critical items. For the Medical CS, differentiation was achieved with four out of six critical items. When raw values (without coding and weighting) were utilized, significant differences were found for the Medical CS but not for the Alcohol CS.

Conclusions

The ISR seem to be the most appropriate measure when the objective is to differentiate between normal and antisocial adolescents. The CS appear to be viable indicators of current problems in all areas except for Medical and Alcohol sections. The ISR includes all of the information needed to assess the severity of problems, while the CS expresses the current level of problems without consideration of historical or contextual circumstances.

In addition, there are some general problems related to the CS. First, the CS are not currently standardized to a common scale; such standardization would be valuable as it would facilitate comparisons.

Second, the combination of items into a weighted sum should be reconsidered. Weights are easily adjustable and should perhaps be chosen on the basis of empirical studies rather than the opinions of expert judges as more and more data becomes available. A system in which different weighting schemes are used for different purposes, such as the prediction of treatment outcomes or diagnosis according to *DSM-IV*, might be useful in future.

Third, the compression of information for individual items into a score with a limited number of scale steps should be reconsidered. Sometimes it is necessary to set an upper limit, for instance on the amount of money spent on alcohol or drugs, but care should be taken not to reduce variation more than necessary in order to preserve variability.

Fourth, the selection of critical items for the CS should perhaps be reconsidered. In this paper, we discussed only the ISR and the CS, but an obvious third outcome variable is the adolescent's self-assessed concern and need for help in each area (AR). Those two variables are included in the CS and should be considered by the ISR, which means that they have a great common impact on both CS and ISR. Our suggestion is that the adolescent ratings of concern and need for help should not be included in the CS

because they do not represent factual information but rather a very important subjective domain that should be considered separately and as a third important type of outcome. Today, much of the variability in the CS stems from these two subjective ratings, which make the CS and AR unnecessarily redundant.

Study III

Börjesson, J., Ybrandt, H. (submitted). Concurrent and predictive validity of the Adolescent Drug Abuse Diagnosis (ADAD).

Purpose

The objective of Study III was to examine the concurrent validity of the ADAD Psychological status and problem area by determining its correlations with the YSR and the BDI in a group of normal adolescents. The predictive validity of the ADAD's Psychological status and problem area was examined in both the normal group of adolescents and in a group of adolescents with antisocial behavior problems. An additional objective was to determine which items in the Psychological status and problem area are most important for explaining the variance in total problem severity, externalizing, internalizing problems (YSR) and depression problems (BDI) in the two adolescent groups.

Results

The ADAD psychological status and problem area was shown to have good concurrent validity for normal adolescents, and low to moderate predictive validity for normal and antisocial adolescent groups. Furthermore, the most important items in this problem area allow for differentiation between the normal and antisocial adolescent groups on the YSR and BDI measures. Furthermore, the ADAD psychological status and problem subscores were significantly correlated with both internalizing and externalizing problems. Stronger correlations were found between the ADAD psychological status and problem subscores and YSR internalizing problems than was the case for YSR externalizing problems. It seems that the ADAD psychological status and problem subscores consist mainly of questions dealing with

internalizing problems. The analyses demonstrated significant differences between the means of the groups in the ADAD Psychological status and problem area, and between the YSR and BDI scales. The results also show that there were about ten items in the PPCL that explained significant amounts of the variance in the two adolescent groups on the BDI and YSR.

Conclusions

For clinical practice and research purposes, the ADAD Psychological status and problem area may be an appropriate assessment tool for measurement of current psychological problems.

However, it is important to consider that the best results obtained in this study related to internalizing problems, and it was these that were primarily identified and evaluated by the ADAD. This instrument is perhaps less useful in summarizing the unique problems in groups of adolescents who have antisocial problems with a more externalizing character. It might be beneficial to add questions describing externalizing problems such as aggression and delinquent rule-breaking behavior in order to make the instrument more suitable for that group of adolescents.

The results also show that there were about ten items in the PPCL that explained much of the variance in the two adolescent groups on the BDI and YSR. This suggests that it might be possible to reduce the number of items in the PPCL.

GENERAL DISCUSSION AND CONCLUSIONS

The general aim of present thesis was to investigate the psychometric properties of a Swedish version of the ADAD in normal adolescents and adolescents with antisocial problems.

Overall, the results in study I agreed well with the two previously published international evaluations (Friedman & Utada, 1989; Bolognini et al. 2001). The ADAD interview produced reliable and good interrater reliability; the CS showed moderate internal consistency, and the concept validity was adequate and comparable to that of the American and Swiss versions. Finally the ADAD CS produced significant and meaningful correlations. ISR, AR and CS were compared and discussed. The Swedish

version of ADAD appears to be a psychometrically good instrument for assessing the severity of adolescents' problems and their need for treatment.

However there are some issues that merit further discussion. The CS values suggest that the differences between normal adolescents and adolescents with antisocial problems were rather small; much more pronounced differences were indicated by the ISR and AR scores. This contradicts the arguments of Friedman and Utada (1989) and implies that the CS are not the most appropriate tools for describing differences between groups of adolescents or describing changes in problem levels. Another issue is that the CS values for the normal group were significantly higher than those for the antisocial problem group in some problem areas, which may be indicative of problems in the way the CS are calculated. The use of CS might lead to systematic overestimations of the problem level in these areas, especially if there are few problems. The differential validity of the CS is uncertain for these problem areas and further research is necessary.

Overall, the results of study II suggest that the ISR is the most appropriate outcome for comparing two different adolescent groups to one-another. The CS seem to act as indicators of current problems in all problem areas except for those related to alcohol and medical issues. In study II, different trends were observed for the CS and ISR values: for normal adolescents, the CS was generally higher than the ISR, but the reverse was true for adolescents with antisocial problems. This may be because interviewers tend to be more restrained when assessing the severity of normal adolescents' responses and less so when dealing with adolescents known to have antisocial problems. This is plausible because the interviewers will be aware of the troubled pasts of the antisocial problems group, which might introduce unwitting prejudice when assessing the severity of their current problems, while the reverse would be true when working with normal adolescents. Another possible explanation is that the CS might be insensitive to these problems in youths. Analyses of individual items that contribute to the Medical and Alcohol CS provide some support for this position.

The results of study II concerning the Alcohol CS showed no significant differences between the groups; only three out of seven critical items within the Alcohol CS were shown to differentiate between the two adolescent groups. However, both the AR and the ISR suggested that the adolescents with antisocial problems did in fact also have alcohol-related problems. The failure of the CS to distinguish between the two groups in this problem area

may be attributable to a poor selection of constituent items or unsatisfactory coding procedures. This indicates that the critical items forming the CS are not well chosen or designed and that overreliance on CS in this problem area might give rise to misleading pictures of youths' problem profiles. This conclusion is further supported by the fact that no differences between the two groups were found for the Medical CS, but when the raw values (without coding or weighting) of the critical items were used, significant differences between the two groups were apparent. The coding procedure used for the critical items in the CS might in fact reduce the ability of the CS to discriminate between normal and adolescents with antisocial problems. Basically, study II showed that the CS seems to be adequate indicators of current problems in all areas except for medical and alcohol problems.

However, some general problems with the CS were identified. First, the CS subscales are not standardized to a common scale and do not vary over the same range; consequently, each scale must be considered in isolation. One possible solution would be to rescale the CS to some standardized mean value. A standardized threshold would greatly facilitate evaluation and interpretation of the CS. Second, the combination of critical items into a weighted sum should be reconsidered. Moreover, there are a number of incongruities associated with the method used to calculate the CS. These problems have been noted in the ASI as well (Jansson, 1999). Third, the compiling of information for individual items into a score with a limited number of scale steps should be reconsidered to avoid ceiling effects and misleading results. Fourth, the selection of critical items for the composite score should perhaps be reconsidered. Both the CS and the ISR incorporate the adolescents' own ratings of their problems, which have a significant common impact on both outcomes. It might be useful to exclude the adolescents' ratings from the CS since they do not represent factual information but are instead a very important source of subjective data that should be considered separately and as a third important type of outcome. Much of the variability in the CS stems from these two subjective ratings, which make them unnecessarily redundant.

Another problem with ADAD is that the interview was developed 21 years ago and so it may be necessary to reformulate some items or reassess their importance because times have changed and their relevance or utility may have declined. The Alcohol CS in particular might not correctly reflect the alcohol consumption of normal adolescents in modern western society, which has increased over the last 21 years; this may explain the lack of

difference between antisocial and normal adolescents in the CS. However, the ISR data suggested the existence of a significant difference between the groups. If there is a true difference between the groups, it is essential that interviewers of clinical groups are familiar with the problem levels of normal adolescents.

A further consequence is that some items should be deleted and new items with more clinical relevance should be substituted for items which do not differentiate between those with problems in a given area and those without. New items could be constructed by adding questions about the point at which certain behaviours start causing problems in the subject's daily life, in the spirit of the criteria constructed for the DSM-IV system of psychiatric diagnoses (American Psychiatric Association, 2001), e.g. the point at which alcohol consumption starts causing problems with school attendance or friendship.

The key conclusion from these studies is that the internal structures of and relationships between the problem areas are essentially the same in the two groups, which reinforces the picture of ADAD as a good measurement instrument. The ADAD interview seems to be valid, with a reliability and factor structure that closely resemble those of the American and Swiss language versions. The overall CS effectively discriminated between normal adolescents and adolescents with antisocial problems. However, further research into the CS is needed because some problems were identified, particularly for the Medical and Alcohol CS.

There is a great need for further studies focused on the scoring of subjects with few problems because it is important to know whether adolescents without any problems score zero or near zero on different measures of ADAD. It can be frustrating both for adolescents and clinical workers to attempt to reduce an adolescent's problems to a zero level, if this zero level is in fact below the norm (Weisner et al. 2000).

Study III showed that the ADAD psychological status and problem area has good concurrent validity for normal adolescents, and low to moderate predictive validity for normal adolescents and adolescents with antisocial problems. The results concerning the important items included in the Psychological status and problem area revealed differences between the normal group and the group with antisocial problems on the YSR and BDI measures. The results also show that there were about ten items in the PPCL that accounted for much of the variance in the two adolescent groups on the BDI and YSR. This suggests that it might be possible to reduce the number

of items in the PPCL. This would reduce the number of items and make the questionnaire easier for adolescents with issues such as attention and hyperactivity problems to complete. Furthermore, study III showed that the ADAD psychological status and problem subscores were significantly associated with both internalizing and externalizing problems although stronger correlations were found between the ADAD psychological status and problem subscores and YSR internalizing problems as compared to YSR externalizing problems. It seems that the ADAD psychological status and problem subscores consist mainly of questions dealing with internalizing problems. Consequently, ADAD was primarily useful in highlighting internalizing rather than externalizing problems. This instrument is therefore perhaps less useful in summarizing the unique problems in groups of adolescents who have antisocial problems with a more externalizing character. Perhaps questions should be added describing externalizing problems such as aggression and delinquent rule-breaking behavior in order to make the instrument more suitable for such subjects.

In summary, the ADAD Psychological status and problem area has good concurrent validity and proved to be useful for differentiating between adolescents with and without psychological problems. For clinical practice and research purposes, the ADAD Psychological status and problem area may be an appropriate assessment tool for measurement of psychological problems.

In summary, the studies described in this thesis showed that the Swedish version of ADAD seems to be an appropriate instrument with both satisfactory reliability and validity.

It is recommended that users of the ADAD interview should be informed of the psychometric properties of the ADAD during their education so as to ensure they understand what conclusions can be drawn from the interview.

The national board of social services requires that all behavioral tests implemented in Sweden satisfy five quality criteria (Socialstyrelsen, 2006). The ADAD instrument satisfies four of these five demands; specifically, there is a *Swedish version* of the ADAD instrument; it has a *Swedish manual* with instructions and so on, and according to this thesis the Swedish version of the ADAD instrument has satisfactory *reliability* and *validity*. However, there is a need for further research concerning *standards* or *benchmarks* that are representative of the general population, preferable specified for gender and age. To this end, a normative study is currently in progress in Sweden, featuring adolescents aged between 12 and 20.

Furthermore, there is a need for data on a wide range of adolescent groups. For instance, the social services' ADAD data would be very valuable; this group is expected to be positioned somewhere between normal adolescents and those admitted to special youth homes in terms of problem severity. Further studies on the instrument are needed to explore its relationship with the ASI, which is designed for young adults above the age of 19. It would be useful to know which of the two instruments is most appropriate for studying young adults aged between 19 and 20.

There are some important issues that should be considered before implementing the ADAD in social activities. First, according to this thesis, the properties of the CS can vary depending on the group being measured. For a group of normal adolescents, the CS were higher than the ISR, while for a group with antisocial problems, the CS were lower than the interviewer severity ratings. Second, the ISR are the best measure for differentiating between the two adolescent groups. However, the CS were able to differentiate between the two groups in all problem areas except for those related to alcohol and medical issues. Of the seven items incorporated into the alcohol CS, discrimination between the two groups was achieved by only three.

Limitations

Some limitations of the studies discussed herein should be acknowledged. Notably, the small size of the group of antisocial adolescents (group II) is a significant weakness; this group may not be representative of adolescents with antisocial problems in general. Second, the normal sample was relatively small, and the age range of this group was quite limited (15–17), compared to the group of antisocial adolescents (10–21). In addition, the normal individuals were drawn from a midsize town in the north of Sweden, and there was a relatively large attrition in the normal group, which makes generalization to the wider population of adolescents uncertain. The level of problems would probably be higher among normal adolescents in a larger city. However, these limitations should not have any consequences for the results concerning problems with the CS (study II) because the CS tends to be overestimated for the normal group even with this sample. Third, these studies only examined the concurrent validity in a single group of normal

adolescents; further analyses should be conducted with more diverse groups.

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