

## SCORING THE CTS2 AND CTSPC

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## GENERAL POINTS

This document is meant to supplement the scoring information given in the papers on the CTS2 (Straus, Hamby, Boney-McCoy, and Sugarman 1996) and the CTSPC (Straus, Hamby, Finkelhor, Moore, and Runyan 1998).

The CTS is best scored by entering the items into any statistical program such as SPSS, STATA, etc. and using the program to recode and sum the items to obtain the scale scores.

The scoring of the CTS2 and CTSPC is slightly different than the scoring of the CTS1 because the CTS1 did not have a response category of 7 ("Not in the past year, but it did happen before").

### Scales, Subscales, and Scoring Methods

The difficult thing to get on top of is that each of the scales includes subscales. In addition, several scores are possible for each scale and subscale. The many possible combinations of scales and scoring methods is shown in the attached table. Each cell in this table represents a different variable that can be computed. But even that table does not fully encompass the possibilities because there are still other, less frequently used, scoring methods.

Preferred Scores. For most uses, the Prevalence score (whether the respondent engaged in one more of the acts in the scale or subscale) is the most frequently used score (see below). For some purposes, a Chronicity score is also important. For clinical use with a population known to be violence, the preferred scoring method will probably be Annual Frequency.

Referent Period. The "default" referent period for the CTS is the previous year. However, there are circumstances when the CTS should be administered using a different referent period, such as a shorter period to minimize recall bias (e.g. past six months or month), or a "bounded" recall period such as "since starting (completing) the program." In this document, the term Annual Prevalence should be interpreted as referring to whatever referent period was used when the CTS was administered, which could be one of the alternatives just mentioned.

### Terminology For Minor, Severe, and Overall Assault

As indicated in the attached table, for most of the CTS scales, there are subscales measuring two levels of severity. In the case of the Physical Assault scale, the items used to score Severe Assault are considered more severe in the sense that they pose a greater risk of injury that would require medical attention than the items used to score Minor Assault. The Overall score measure uses the entire set of 12 items. The terms Minor and Severe have the disadvantage that "minor" might be interpreted as suggesting something that is not a serious problem for either victims or society. If you are presenting results in a context where this misinterpretation might occur, consider using the alternative terms such as Level 1 and Level 2 or less severe and more severe.

### Misprints In Article On The CTSPC Which Result In Scoring Errors

These have been corrected in reprints distributed by the Family Research Laboratory, including the reprint in the CTS Handbook. However, if your copy was obtained directly from

the journal, see the addendum at the end of this document.

## CLINICAL INTERPRETATION OF SCORES FOR INDIVIDUAL CASES

### Physical Assault, Sexual Coercion, and Injury Scales

The Physical Assault scale indicates whether the respondent engaged in such behavior and the number of times it occurred in the referent period. The individual items should be examined in addition to the scale score because of the different implications of, for example, slapping as compared to punching. The same principle applies to the Injury and the Sexual Coercion scales.

### Psychological Aggression, Negotiation, And Non-Violent Discipline Scales

CTS2. The chronicity scores in Table 4 of Straus et al (1996) give the average number of times a sample of men and women college students engaged in those behaviors with their partners. The means are high because this is a young sample, but with this and the fact that it is also a high education sample, comparison of the scores of a client with these means may still be useful.

CTSPC. Scores of a respondent can be compared with the scores for a national sample of American parents given in Table 1 of (Straus et al. 1998).

### Omitted Items

If an item is omitted, the test responses should be discussed with the client before scoring. It may indicate that the respondent engaged in the behavior and did not wish to report. If so, the missing data can sometimes be replaced using the information disclosed at that point.

## EXPLANATION OF PREVALENCE AND CHRONICITY SCORES

Except when using the CTS clinically to evaluate a specific case, and except for research on populations who are victims of violence or perpetrators of violence, there is usually a need to create separate scores for the Prevalence and Chronicity of Physical Assault, Sexual Coercion, and Injury.

The need for separate prevalence and assault scores on the Physical Assault scale occurs because, in a non-clinical population, there will usually 70% to 90% with a score of zero. Such an extremely skewed distribution makes the mean, and even the median inappropriate, violates the assumptions of many statistical procedures, and also creates problems with outliers. Moreover, the distribution is so skewed that no transformation is sufficient to normalize it. Separate prevalence and chronicity scores are one way to create meaningful measures of central tendency and to deal with the outlier problem.

The prevalence score enables one to say; for example, that a certain percent of a group experienced a physical assault. The chronicity score enables one to say how often it happened among those who assaulted or were assaulted, for example, 5.3 times during the referent period.

Measures Of Central Tendency. With a distribution as skewed to the zero end as indicated above, the mean will usually result in an uninformative statistic such as a mean of .004 for Group A and a mean of .002 for group B. To have a measure of central tendency that is informative requires a score that describes the frequency only for those who engaged in at least one of the acts, i.e. the chronicity score.

Outliers. The Annual Frequency score (see below) weights the items in the scale by their frequency of occurrence. The scores for the 12 items can range from zero to 300 (12 items \* max score of 25 for each item = 300) but most will have scores of 1, 2, or 3. The remainder are stretched out over a range from 4 to 300. This gives tremendous influence to a relatively few outliers with a high frequency of assault. A dichotomy such as the prevalence score is one method of restricting outliers from having an undue influence.

Problems Using Separate Prevalence and Chronicity Scores. The chronicity score will be available only for the fraction of the sample that engages in physical assaults. Another problem is that, although the combination of the prevalence and chronicity scores provides the most complete description of assaults or injuries, it complicates the data analysis and the research report because many analyses must be computed and reported twice, once for prevalence and once for chronicity.

## METHODS OF SCORING

Although the CTS is a simple list of behaviors asking how often each occurred, it can be scored in a large and confusing number of ways. However, as explained above, there is a “default” scoring method – the Prevalence score. I recommend starting with that score. If the results of using the Prevalence score does not meet your needs, you can then explore one of the other scoring methods.

### Prevalence

This is the most frequently used type of score for the Physical Assault scale and subscales. The prevalence score indicate whether one or more of the acts in the scale were used during the referent period. Thus, it does not differentiate on the basis of how many of the acts were used or how often each act was used.

Create dichotomous versions of the items. A score of 1 indicates one or more acts of violence in the past year: Score 1 if there is a response of 1, 2, 3, 4, 5, or 6 to an item. Score zero if there were no violent acts in the past year. (all items answered 0 or 7). Note that you do NOT sum the dichotomous items.

As indicated above, this method assigns a score of 1 (or 100 if you want the mean to be expressed as a percentage) for any subject who reported one or more instances of any of the acts in the scale. The prevalence score is appropriate for the psychological, physical, and sexual assault scales and for the injury scale because, for many purposes, the key issue is the percent of the population in which an assault or injuries during the referent period.

### Annual Chronicity (“Chronicity” score)

The chronicity score is the sum of the number of times each act in a scale was used by those who used at least one of the acts in a scale. To create a chronicity score:

A. Create chronicity versions of the items by flagging all responses of 0 or 7 as missing

data.

B. Sum the chronicity versions of the items

#### Ever Prevalence ("Ever occurred" score)

1 = One or more of the acts occurred in either the past year OR previously: Scored 1 if any violence item is answered 1 through 7

0 = None of the items answered 1 through 7

#### Annual Frequency

The problem with this score is that, for the Physical Assault scale (and to a lesser extent the Psychological Aggression scale), it is extremely skewed for community samples (for example, 85% with a score of zero). As a result, the mean is not a useful statistic (see example above). However, Annual Frequency is usually the preferred way of scoring the Negotiation scale, and is sometimes appropriate for the Psychological Aggression scales of the CTS2, and for the Non-Violent Discipline Scale and Psychological Aggression scale of the CTSPC.

A. Create recoded versions of all violence items by recoding 7 to be 0, and values of 3 through 6 to be the midpoints as follows: 3 = 4, 4 = 8, 5 = 15, 6 = 25 (an assumed mid point)

B. Sum the items in the scale.,

#### Cutting Points For Negotiation and Psychological Aggression Scales

In the case of the Negotiation and Psychological Aggression scales, it may be advisable to set a threshold criterion to identify cases to be considered "low" in use of Negotiation or "high" in use of psychological assaults, such as 3 or more instances, 5 or more instances, 10 or more instances, etc (see Straus and Sweet 1992). When the purpose of the analysis is to compare groups, such as married versus cohabiting couples or low and high SES subjects, a percentile, such as the 80th percentile for the combined population, can be used as the division point for the dichotomization.

### MISSING DATA

When a respondent has omitted even one of the items in a CTS scale, the choice is to either code the case as a missing value in respect to that scale or subscale and therefore lose the case for analyses involving that scale, or to try to retain the case by using some method for replacing the missing response. However, with the exception of Method 1 under Prevalence Scores, each method of replacing missing values has problems. Method 1 is recommended for all uses of the CTS where a "prevalence" score is used. With that one exception, unless your study has such a small sample that you cannot afford to lose any cases, the best thing is to accept the loss of a scale that has an unanswered question. If these cases cannot be lost, Method 2 or 3 are possibilities.

#### Prevalence and Ever Prevalence Scores

Method 1. This method applies only to Prevalence scores as described earlier in this document. It is recommended as a standard method of obtaining prevalence scores for the Physical Assault, Psychological Aggression, Injury, and Sexual Coercion scales. The procedure is to score the scale as 1 (or 100) if the response to one or more of the behaviors in the scale indicates that the behavior was enacted.

#### Annual Frequency And Chronicity Scores

Replace missing items with the mean or median is not recommended. This is the most usual method of replacing missing data in psychological and sociological research and it is probably appropriate for the Negotiation and possibly also the Psychological Aggression scales. It is not appropriate for the Physical Aggression, Injury, and Sexual Coercion scales because the mean and median is usually zero. Consequently, replacing a missing value for an item with a score of zero, in effect, assumes that, if the respondent had answered, they would have indicated that they did not engage in the behavior. However the results of a study by McCarroll et al (2000) can be interpreted as indicating that respondents who omit questions on the Physical Assault scale are likely to be people who did engage in the behavior but chose not to report it. Consequently, alternatives are given below.

*Method 2.* Compute the mean of the items in the scale that were answered. Note that if you are using SPSS, this method must use COMPUTE MEANVALU, not just COMPUTE

*Method 3.* Based on the McCarroll et al study described above, you can try coding the scale as (indicating having engaged in the behavior) if there are any unanswered questions. Note: An answer of Zero is not an unanswered question or missing data. Be careful not to confuse Zero with missing data.

#### Conditional Replacement For Severe Assault

This is a more conservative method. If one or more of the Severe Assault scale items is missing, code the Severe Assault scale as indicating the presence of assault, but only if the respondent answered at least 2 of the Minor assault items.

#### Annual Frequency Scores

Replace missing values with a score of 1 for each missing item, for up to 2 missing items on the Psychological Aggression scale, and for up to 3 missing items on the Physical Assault scale. Thus, if there are 3 or more missing items in the Psychological Aggression scale or four or more are missing on the Physical Assault scale, the score on the scale is missing.

Note that if the above method is used, there can be cases with missing data that have had that data replaced for the prevalence score, but did not meet the criteria for the annual frequency score.

#### Investigate The Effect of Replacement

I recommend that you investigate the effect of replacing missing values as compared to dropping the case. To do this, repeat some cross tabulations, regressions, or ANOVAs for the sample that excludes cases with a missing item and for the sample that includes cases that have been score using the above procedure. Then try to decide if the results are more meaningful with the adjustment for missing data. Be sure to pay attention to the "effect size" as well as significance level because the significance level is influenced by the number of cases, whereas the effect size is not. If you do these comparisons, I would be very interested in learning what happened.

### TAKING SEVERITY OF ASSAULTS INTO ACCOUNT

The physical assault items differ tremendously in their severity. Some, such as punching or using a weapon, are much more dangerous than attacks in the form of slapping and shoving. The Minor Assault and Severe Assault subscales were developed to take this important difference into account. But even within those subscales, the items differ in severity.

In some circumstances it may be useful to compute scale scores that are weighted by the severity of each item. The main circumstance for using a severity-weighted score occurs when testing a population in which all the subjects have been violent during the referent period and the important issue is severity of the violence. An example would be men in a treatment program for partner assault, but even then it may not be the best procedure. Usually the best way to take severity into account is to create subscales for Minor and Severe assault, and use the frequency of occurrence for additional weighting.

### Severity Types

The severity types (also called Severity Level) described in paper CTS37 classify respondents into three mutually exclusive categories: 0=None, 1= Minor Only, and 2=Severe. I recommend this as the default method of including severity.

The best method of statistical analysis using the severity level types is probably multinomial logistic regression. Use the None category as the reference category.

If Severity Types are used as the dependent variable the program will provide separate odds ratios for how much each change of one unit of the independent variable affects the odd of Minor Only, and how much it affects the odd of Severe.

If the Severity Types are used as an independent variable, the program will provide separate odds ratios showing how much the presence of Minor Only affects the odds of the dependent variable, and also for how much the presence of Severe affects the odds of the dependent variable.

Although the primary purpose of the severity types is to identify these categories, the severity type measure can also be used as a three-level ordinal measure of severity with values of 0 to 2, and can be used as the dependent variable in OLS regression and ANOVA. It is usually a highly skewed variable with most cases in the 0 category. Consequently, the results are usually mean scores such as 0.3, 1.1 which do not have a directly understood meaning. In addition, the skewness is not a good fit with the assumptions of OSL and ANOVA.

### Severity Weights

In some publications on the original CTS, I referred to a Severity Weighted Score. The correct name should have been Severity Times Frequency Weighted score. It is computed by multiplying the frequency of an act (i.e., of an item) times a weight for the severity of the act and summing the products. In most situations, it is better to avoid using these severity weights for the following reasons.

Exacerbates Outlier Problem. The resulting score exacerbates the outlier problem even more than does the weighting by frequency of occurrence in the Annual Frequency score described above, and also is difficult to interpret (see below). Consequently, it is probably only appropriate to use this score as a refinement of the Chronicity Score, and even then only under certain circumstances.

Scores Not Intuitively Understandable. Because the Severity Weighted scores are the product of the severity weight times the frequency of occurrence, the resulting scores have no directly perceivable meaning. This is in comparison to a frequency weighted or chronicity score. For example, in a study of men in a treatment program for batterers, using a frequency

score, you might find that the treatment group decreased from a mean of 14.2 times to 5.4 times. Thus, according to this hypothetical data, even the treated subjects who remained violent seem to have decreased in how often violent incidents occurred. However, if you use a severity-weighted score, you have to say that the severity weighted scale decreased from (for example) 43.1 to 12.3. But no one knows what either 43.1 or 12.3 is; whereas everyone knows what 14.2 times and 5.4 times is. Nevertheless, there probably are circumstances where the weighted score is worth the statistical and communication problems. In addition, differences that are not otherwise statistically significant might be significant when using the presumably more sensitive measure involving severity (although I have so far not found that to be the case).

Suggested Severity Weights for the CTS2. If there is a situation where severity weights are appropriate, here is what I suggest. Note, that as in the case of the weights suggested for the original CTS, these weights are based on my judgment, not on empirical evidence.

Items 7, 9, 17, 45, 53 = 1

Item 27 and 73 = 3 (weighting item 27 as 3 rather than 2 is the only change from the CTS1)

Item 33, 37, 43, and 61 = 5

Item 21 = 8

#### Subscales For Minor and Severe Assault

The best way of taking severity into account when using the CTS2 may be to create separate subscale scores for Minor and Severe Assault (CTS2). When using the CTSPC, create separate subscales for Ordinary and Severe Corporal Punishment, and to measure "physical abuse" use Severe assaults subscale. In my opinion, the frequency of occurrence weighting of these subscales provides an adequate measure of severity.

#### CTSPC Distinction Between Ordinary and Severe Corporal Punishment

When using the CTSPC, the terminology is confusing because the Minor Assault items, which are used as a measure of corporal punishment by parents, are subdivided into Ordinary and Severe corporal punishment. The confusion is because the word severe is also applied to all the items that are not in the Minor Assault category.

The "ordinary" corporal punishment items are H and P, and the severe corporal punishment items are D, R, and V. Item C (shake) is classified as ordinary for children age 2 and over, but as "maltreatment" rather than corporal punishment for children under 2 because it is so dangerous for young children. See Straus and Stewart (1999) for an example of use of the above classification. If you are working from a reprint of the article on the CTSPC taken directly from the journal, see the addendum below.

### SCORING USING SPSS AND OTHER STATISTICAL PROGRAMS

The following steps illustrate use of SPSS, but the principles are the same when using other statistical packages.

#### Create A File Of The Items and Case Identification Information

There should be a row for each case and a column for each item.



The first column is the case identification number that you assign to each case. The next columns are for demographic and family characteristics such as age, sex, whether married or cohabiting etc. This is followed by the scores for each CTS item. The order of the columns is not important, but it is critical to include a case identification number.

I suggest using CC as the first letters of the "Variable Name" for CTS items, .e.g., CC1, CC2, CC3 etc.

### Create Recoded Versions Of The Items

The scores for CTS scales must be created using versions of the items that have been recoded into the form needed for the type of scale score you want. The two most frequently used scoring methods are Annual Prevalence and Yearly Frequency. It is essential to carefully follow the scoring instructions in the 1996 article on the CTS1 (pages 305-306) or the 1998 article on the CTSPC (page 263). Be especially careful about recoding category 7.

I suggest using the following suffixes to the "variable names" to identify the scoring method:

C	Chronicity
E	Ever
P	Annual Prevalence
Y	Yearly frequency

To create recoded versions of each item, click on Transform and then Into New Variable

Type in the variable name for the recoded version of the item using the above suffixes.

For Prevalence versions of the items, the variable names would be CC1P, CC2P, CC3P etc., whereas for Yearly Frequency versions they would be CC1Y, CC2Y, CC3Y etc.

There should be a recoded item for each raw score item. Thus, if you want to create scale scores for Prevalence and scores for Annual Frequency, you would need three sets of items: the items in their original form, the items recoded to prevalence form, and the items recoded to annual frequency form.

### Compute Scale Scores

Click on Transform and then Compute

Type in the variable name for the CTS scale score. I suggest using CT to indicate all scale scores (compared to CC for the items), and the following codes to indicate which scale:

A	Physical Assault
I	Injury (CTS2)
N	Neglect (CTSPC)
N	Negotiation (CTS2) or Non-Violence Discipline (CTSPC)
P	Psychological Aggression

S Sexual Abuse (CTSPC)  
S Sexual Coercion (CTS2)

Letters To Identify Minor, Severe, and Total. In addition to the above codes to identify the different scales, you also need to identify whether the score is for minor or severe subscales or the overall (total) scale). To do this, use the suffixes M, S, and T. "Variable Labels are also important because, with an limit of 8 characters, the "variable name" requires extreme abbreviations that, a month or two later, you will have trouble figuring out unless there are also Variable Labels.

Here are some examples of the Names and Labels for minor and severe subscales of Physical Assault, and for prevalence and annual frequency scores for each.

<u>Var Name</u>	<u>Var Label</u>
CTAMP	Physical Assault, Minor, Prevalence
CTASP	" Severe, "
CTAMY	Physical Assault, Minor, Year Frequency
CTASY	" Severe, Year Frequency

#### General Cautions

Run Frequencies for each of the items and inspect the frequency distributions before starting to compute scale scores. There may be errors in typing in the data, such as a score of 8 when the maximum is 7

Run Frequencies for each scale score as soon as you have computed the scale score and look it over carefully. Errors from wrong syntax are common and you will not know that the score is wrong unless you look at the frequency distribution carefully for impossible values, degree of skewness, etc.

#### ADDENDUM TO ARTICLE ON THE CTSPC

The article in Child Abuse and Neglect, 1998, Volume 22, No. 4, pp pages 249-270 should be corrected as follows (These corrections have been made in reprints distributed by the Family Research Laboratory and in the CTS Handbook):

Page 255, Table 1, item M should be scalded (not scolded)

Page 256, line 6: The items in the Severe Physical Assault subscale include item I (not item L).

Page 268, right column: Item V should be scored as part of the Minor Physical Assault subscale, not as part of the Severe Physical Assault subscale.

#### REFERENCES

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FOUR METHODS OF SCORING				
SCALE AND SUBSCALE	PREVALENCE	CHRONICITY	ANNUAL FREQUENCY	EVER PREVALENCE
<b><u>CTS2</u></b>				
Negotiation				
Emotional				
Cognitive				
Psych. Aggression.				
Minor				
Severe				
Physical Assault				
Minor				
Severe				
Sexual Coercion				
Minor				
Severe				
Injury				
Minor				
Severe				
<b><u>CTSPC</u></b>				
Nonviolent Discipline				
Psych. Aggression				
Ordinary				
Severe				
Physical Assault				
Minor (Corporal Pun.)				
Severe ("abuse")				
Neglect				