Author's response to reviews

Title: Intra-cluster correlation coefficients in adults with diabetes in primary care practices: The Vermont Diabetes Information System Field Survey

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Title: Intra-cluster correlation coefficients in adults with diabetes in primary care practices: The Vermont Diabetes Information System Field Survey

Response to Reviewers’ reports

4 April 2006

Date: 22 March 2006
Reviewer: Patty Chondros

Background

1) Paragraph 2:
“The inflationary factor, sometimes called the design effect, is a function of how much correlation there is within each cluster. This clustering can also be quantified by the intra-class coefficient (ICC).” The term “design effect” and “(variance) inflation factor” are used interchangeable in statistics. For this reason using the adjective “inflationary” in this context to describe the degree to which the sample size needs to be inflated can be confused with the statistical term “inflation factor”. Suggestion is to either use the correct statistical term “inflation factor” or use a different term to describe the author’s intended meaning of “inflationary factor” used in the paper.

Done.

The definition of ICC (intra-cluster correlation) is the correlation within clusters. The two sentences (above) are effectively describing the same quantity. As previously suggested, the second sentence should be changed to “This correlation is known as the ICC”, otherwise the two sentences are repetitive.

Done.

Statistical analysis

2) 2nd paragraph, line 4: change word “relationship” to “association”

Done.

3) With regards to the calculation of Spearman’s correlation coefficient: It is not clear whether all the reported proportions were converted to range between 0 to 50% (or conversely, 50% to 100%) before calculating Spearman’s correlation? For instance, if the range for reported proportions is between 0 to 50% used calculate rho, then the reported proportions for married (62.5%) and high school graduate (75.4%) would need to have been converted to (100-62.5%=37.5%) and (100%-75.4%=24.6%), respectively. Similarly, it is not clear whether the rho calculated using Spearman’s correlation is showing a positive correlation between ICC and reported proportions that range between 0 and 50%
or positive correlation between ICC and reported proportions from 50% to 100%. The two approaches would provide two different interpretations of the estimated rho.

_The methods section now describes this._

5) The analysis of variance described in the methods using Stata does not necessarily provide reliable SE error estimates for binary variables, especially when the reported proportions are <25% or >75%. Need to provide details on the method/formulas used to calculate the standard errors for the ICC for the binary and continuous variables, respectively?

_We have entered the equations from the Stata manual, but we're not sure if they address this issue and if they are a useful contribution given that they are referenced. We would prefer to omit them._

Results & Tables

6) ICCs estimated using loneway in Stata are truncated to zero if estimated ICC is negative. Many of the ICC’s reported as <0.001 in Table 1 may actually be “zero”, and should be reported as such in the table, with a footnote that the ICCs are truncated at zero. Please confirm that ICC’s reported as <0.001 are not negative ICC values that have been truncated to zero. Similarly, the lower confidence interval for ICC should be reported as “0” instead of “0.000”, with a footnote in the table explaining that they have been truncated to zero.

.Done._

7) Last sentence: Describe the strength of the association (rho=0.51) rather than use the word “significantly” which relates to the p-value. Is it as moderate/strong association? Discuss this result in the discussion section, what does it show? How do these results compare to results given in other papers?

.Done._

Discussion

Paragraph 5: “Campbell et al suggest …”. The results should be presented in the results section.

_They appear in Table 1._

Paragraph 11: “For many of these variables…compared to a non-clustered study”. Even a very small ICC can have a great impact on the sample size if the cluster size is large, for instance, variables where cluster size was 120.7 & ICC=0.01, the design effect is 2.2, which is more than double the sample size required for a simple random sample. Need to further clarify paragraph.
Abstract

ICCs varied around a median value of 0.0185 presumably.

Yes. Corrected.

It may not be true that an ICC of 0.001 is negligible, such an ICC may be quantitatively important if the number sampled per cluster is large – as is pointed out in the Discussion.

The text has been changed to “small.”

‘The values reported here’. This might read ‘The ICC values reported here’. However, sample size calculations will require values for standard deviations as well as ICCs, and this is why it may be more appropriate to include the SD rather than the SE in the Tables (see later).

“ICC” has been inserted.

Background

‘In a traditional, non-clustered study ‘ this would be better worded as ‘In a study based on simple random sampling or allocation’

Changed.

‘The inflationary factor, sometimes called the design effect' this would be better worded as ‘The design effect, sometimes referred to as the variance inflation factor’ because, in the context of cluster randomisation, the design effect is commonly referred to as the variance inflation factor.

Changed.

‘How much correlation there is within each cluster’ - better as ‘the extent of correlation within clusters’

Changed.

Statistical analyses (p6)
‘ICC represents the proportion of the total variation in the variable that is associated with the cluster’ better as ‘In the random effects model, the ICC is the proportion of the total variance that is between clusters’.

*Changed.*

An algebraic form of the equation would be preferred in which the between- and within-cluster variance components are identified.

*Done.*

Specify the command used in Stata – ‘loneway’? The method used to estimate confidence intervals for the ICC should be identified. Further, as the confidence intervals are provided, the standard error for the ICC may not be necessary.

*Done.*

Rho is commonly used to denote the ICC, so it would be best to avoid this as the symbol for Spearman’s correlation coefficient in this presentation.

*Done.*

The standard error of the mean values for the variables of interest, is said to be ‘adjusted for clustering within practices’. This is inconsistent with the comment to the reviewers that the SD can be easily obtained from the standard error and the number in the sample.

*We have added the standard deviations to the table.*

The ICCs have been truncated at 0.001. It would be worth stating what proportion of ICCs were estimated to have negative values. Similarly, confidence intervals for the ICCs appear to be truncated at zero.

*The number of truncations is now noted in the results section and Table 1 is modified.*

Results

The results are very briefly described. Table 2 does not appear to be cited.

*The table is cited on page 8.*

Discussion (p7)

‘the average number of subjects per cluster’ – better as ‘the average number of subjects sampled per cluster’
Conclusions (p8)

Again, it does not seem safe to conclude that an ICC of <0.001 will always be negligible.

Table 1.

I still think it would be more appropriate to give the standard deviation for continuous variables. This is because it is the SD and not the SE that is required for sample size calculations.

*We have included the SDs for all variables.*

I also think that the number sampled per cluster would be more appropriate, or at least a useful addition, to the total number sampled. In the one-way ANOVA, a weighted form of the average number of subjects per cluster is used (commonly represented by n-nought) and not the arithmetic mean which is referred to in the resubmission letter.

*Done.*

The SE for age appears to be in error.

*Corrected.*

The SE for number of cigarettes per day seems rather high. It might be more appropriate to only use current smokers to estimate number of cigarettes per day.

*Corrected.*

For dementia, leukaemia, lymphoma, metastatic cancer and HIV disease the total number of cases appears to be less than 10. It is not clear that the ICC could be estimated consistently for these variables.

*We have added a footnote to Table 1 about this.*