

Welcome to OASIS: Optimization App for Selecting Item Subsets

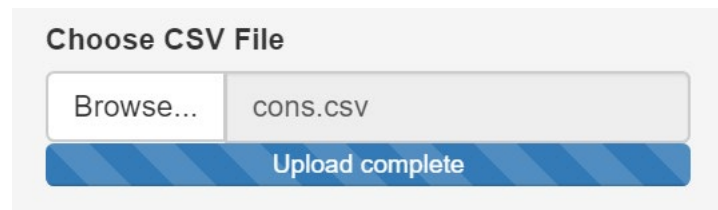
OASIS is a user-friendly app built in R Shiny that assists in identifying an optimal shortened version of an existing measure. OASIS uses a psychometrically defensible optimization strategy that simultaneously considers multiple important criteria such as internal consistency reliability, part-total correlations, general factor loadings, convergent and discriminant validity, and content coverage of the items.

To use the app, open R-studio and run the following 3 lines of syntax:

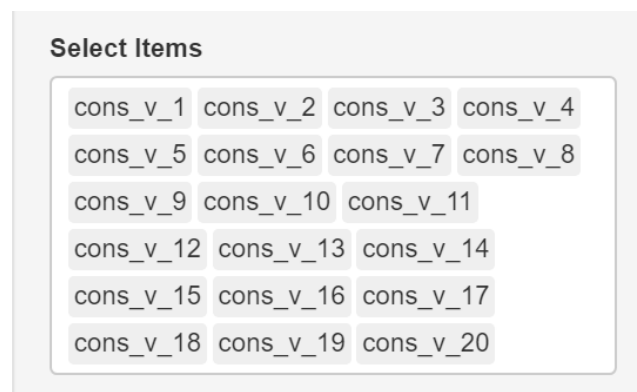
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-----  
install.packages(c("shiny", "shinythemes", "dplyr", "gtools", "mice", "DT", "psych"))  
library(shiny)  
runUrl("https://orgscience.charlotte.edu/wp-content/uploads/sites/561/2023/07/OASIS.zip")  
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```

Description of the example data: We will use an example data set to illustrate the features of the app. The data was collected via MTurk. Participants were administered the 20 conscientiousness items from the BFAS (DeYoung, Quilty, & Peterson, 2007) along with a separate measure of conscientiousness (NEO-IPIP; Goldberg, 1999) to evaluate convergent validity and a measure of generalized self-efficacy (Schwarzer & Jerusalem 1992) to evaluate discriminant validity. While the data corresponding to the scale to be shortened (BFAS) consists of item level data, the measures for convergent and discriminant validity are scale level (i.e. aggregate scores for the items across the entire scale).

Step 1: Choose CSV File - Load the data file by clicking “Browse” then navigate to the data file and click “open”. Currently, .csv is the only permissible format. After your data loads, a sample of it will appear at the top of the right-hand window under ‘Data Snippet’.



Step 2: Select Items - Choose the columns that identify the items from the scale to be shortened. In the current example, those items correspond to cons_v_1:cons_v_20.



Step 3: Select Min/Max Number of Items - Choose the minimum and maximum number of items desired for the shortened scale. The minimum must be at least 2 and the max cannot exceed the number of items selected in Step 2. If you know exactly how many items you want for the shortened scale, you can set the min and max numbers to be identical. If you can restrict the range of these two numbers, you should! The wider the range of values used here, the more computational time is needed for the app to run because the number of possible combinations increases exponentially. If you wish to assess the properties of the original scale, you can set the min and max values equal to the total number found on the original scale. For this working example, we will set both values to 4.

Enter Min Number of Items

Enter Max Number of Items

Step 4: Select Convergent Validity Measure – If you have data to assess the convergent validity of the shortened scale, identify the column of the data set that contains that information. In our example data set, that column is 'NEOcons'. If you have multiple measures, you currently can only submit one measure at a time.

Select Convergent Validity Measure

Step 5: Select Discriminant Validity Measure – If you have data to assess the discriminant validity of the shortened scale, identify the column of the data set that contains that information. In our example data set, that column is 'gse'. If you have multiple measures, you currently can only submit one measure at a time.

Select Discriminant Validity Measure

Step 6: Do you want to calculate Omega-h? – Decide whether you want Omega-h calculated. This is an option because of the computation time required to provide Omega-h values for all the subsets can be quite extensive. The calculation of Omega-h requires at least 3 items.

Do you want to calculate Omega-h? This can be very time consuming & Min # items must be > 2

Yes

Step 7: Do you want to do Content Mapping? – This mapping feature further lets you refine the sets identified according to some item categorization schema. One possible schema may be around content to ensure that the shortened version of your measure adequately reflects the breadth of a particular construct. If you elect to use this mapping feature, you will be provided additional options. First, you would need to indicate how many categories you desire. Currently you can have up to 5 categories. In the next step, you will need to identify which items correspond to which categories. For example, using the illustrative data file, one would likely want to ensure that any shortened measured reflects content related to achievement and conformity. Thus, we elected to do content mapping, selected two categories, and identified items 1-10 (their content reflects achievement) as belonging to one category and items 11-20 (their content reflects achievement) as belong to the second category.

Do you want to do Content Mapping?

Yes

Select number of Content Areas

2

5

Select Variables

cons_v_1 cons_v_2 cons_v_3 cons_v_4

cons_v_5 cons_v_6 cons_v_7 cons_v_8

cons_v_9 cons_v_10

Select Variables

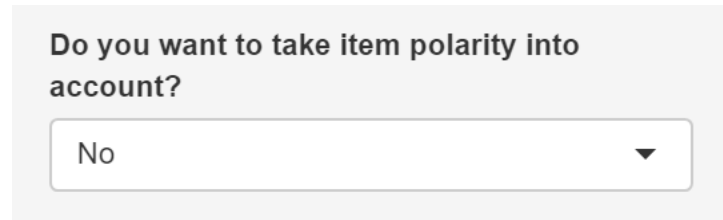
cons_v_11 cons_v_12 cons_v_13

cons_v_14 cons_v_15 cons_v_16

cons_v_17 cons_v_18 cons_v_19

cons_v_20

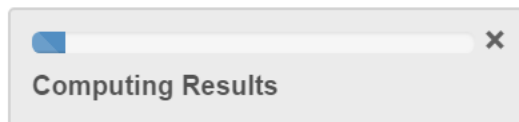
Step 8: Do you want to take item polarity into account? – This feature allows you to ensure that your shortened scale has the desired number of reverse scored items. To utilize this feature, you would select 'Yes' and then indicate which items from the original scale are reverse scored. For this example, we did not consider item polarity.



Do you want to take item polarity into account?

No

Step 9: Click Submit – A progress bar will appear in the lower right as the program iterates through all possible item subset.



Results: When the app finishes iterating through all possible subsets, the progress bar will disappear and a table of results will appear on the right just below the data snippet. Each row of the table contains a subset of items and the columns contain information about the adequacy of each subset.

Explanation of column names (not all column will appear if not requested above) :

num_items: The number of items in a subset

variables: The items that comprise a subset

alpha: Cronbach's alpha calculated for each subset

lambda_2: Lambda2 calculated for each subset

r.part_whole: The Pearson correlation between the average score of the items that make up the subset and the average score across all items from the original scale


omegaH: OmegaH calculated for each subset

ConvValdty: The Pearson correlation between the average score of the items that make up the subset and the score from the measure of convergent validity

DiscValdty: The Pearson correlation between the average score of the items that make up the subset and the score from the measure of discriminant validity

num_items_CA1:num_items_CA5: Number of items in each subset that correspond to the categories from the item mapping process

RS_items: Number of items in each subset that are reverse scored

The results table is interactive and users are able to sort and filter results to meet their desired specifications for a shortened scale. To sort the subsets by a column, click on the triangles next to a column name and to filter a column, click on the box directly below the column name. By default, all columns will display. If filtering a numeric column, a slider bar will appear. If filter a text column, type the text in the box. (see accompanying screenshot). To remove a filter click on the cancel filter icon  in the filter box.

Result:

Show entries

Sort Button: Click here to sort table by alpha values

num_items	variables	alpha	lambda_2	r.part_whole	ConvValdty	DiscValdty
All	All	<input type="text"/>	/	All	All	All
4	"cons_v_17", "cons_v_18", "cons_v_19", "cons_v_20"	0.648	0.641	0.783	0.622	0.366
4	"cons_v_16", "cons_v_18", "cons_v_19", "cons_v_20"	0.695	0.681	0.714	0.548	0.45
4	"cons_v_16", "cons_v_17", "cons_v_19", "cons_v_20"	0.676	0.667	0.714	0.512	0.436

Filter Box: Click here to filter results by alpha

The results table can be downloaded as a .csv file by clicking on the download button. Note that the entire table will be downloaded and not just the filtered results.

Missing Data: If there are any cases who failed to respond to all items from the original measure, the results table will not populate.

If you are experiencing any difficulties with the app, please contact scott.tonidandel@uncc.edu