

RUNNING HEAD: SCHOOL BELONGING – MWERA 2009

Measuring Latino students' perceptions of school belonging:

A Rasch measurement application

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### Abstract

Greater levels of school belonging have been shown to predict a variety of school outcomes including absenteeism, motivation and academic effort in Latino youth (Sánchez, Colón, & Esparza, 2005). School belonging is investigated through various indicators including a sense of school belonging, existence of peer relationships, and the existence of teacher relationships (Nichols, 2006; Faircloth & Hamm, 2005). This study applies the Rasch Rating Scale model to examine the fit and function of the school belonging scales based upon pilot data collected from Latino students. Rasch Rating Scale model was employed to guide revisions to improve the quality of the school belonging measures. This application will aid in improving the stability and accuracy of this measure of school belonging and can guide other researchers studying this construct in the design of their instruments.

## Measuring Latino students' perceptions of school belonging:

### A Rasch measurement application

According to Osterman (2000), the concept of belongingness has been defined in a variety of ways including relatedness, sense of community, and sense of school membership. School belonging measures examine whether students feel like they fit in at their school. The sense of school belonging is measured in various ways including a general sense that one belongs at school, whether the student has a place within a network of peer relationships, and whether the student has bonded with teachers (Nichols, 2006; Faircloth & Hamm, 2005).

Greater levels of school belonging have been shown to predict a variety of school outcomes including absenteeism, motivation and academic effort in Latino youth (Sánchez, Colón, & Esparza, 2005). Osterman's (2000) review of belonging stated that students who have a sense of school belonging were more likely to show higher levels of interest in school, higher expectations of success and less anxiety. Furthermore, children who have a sense of belonging perceived themselves to be more competent with higher levels of intrinsic motivation. While the instrument measures school belongingness, the construct itself is one of relatedness to school. This study will examine the relatedness for Latino students.

Peer relationships are one aspect of a student's sense of school belonging. According to Osterman (2000), children who are accepted by their peers demonstrate more academic competence. Evidence shows that a sense of belonging influences academic achievement through its effects on academic engagement. According to Garcia-Reid, Reid, and Peterson (2005), social support by peers has been positively linked to school engagement. Rejection from one's peers is associated with lower interest in school and school dropout (Osterman, 2000). Supportive social relationships can create incentives for students to attend school and become engaged in school.

Osterman's (2000) review stated that teacher support can influence a students' sense of belonging. Even more, teachers can play a key role in determining whether students feel they are cared for, and they are a part of the school community. Croninger and Lee (2001) argued that teacher-based forms of social support are beneficial for all students, but especially those who are at risk for dropping out of high school.

High school dropout is a problem facing many Latino youth. The event dropout rate for 2005-2006, was 7% for Latino students as compared to 2.9 % for White students and 3.8 % for Black students. Furthermore, Latino students comprised 30.4% of all dropout students, yet they were 16.2% of the population enrolled in school (NCES, 2006). Risk factors for dropping out of high school include having one's family speak little or no English and the student having limited knowledge of English (Roderick & Camburn, 1999). Research suggests that social support can buffer the negative effects of at-risk environments that Latino youth may be exposed to (Garcia-Reid, Reid, & Peterson, 2005). Osterman's (2000) review of the literature found that a sense of belongingness is an important aspect in students' school dropout.

#### Rasch Rating Scale Model

The importance of measuring sense of school belonging is supported in the literature, but a rigorous inspection of the instrument is essential to the development of a stable and accurate measure of this construct. The Rasch Rating Scale model is useful in addressing the subjective nature of survey data and in guiding revisions to improve survey measures based on empirical evidence (Bond & Fox, 2001; Linacre, 2004; Wright & Masters, 1982). Item difficulty, or item endorsement in survey research, is the only independent variable considered by this model. This model assumes that both participants and items can be arrayed on an additive continuum, where item endorsement is the only independent variable (Kan, Breteler, Van der Ven, & Zitman,

1998). Using probability estimates, Rasch measurement provides the difficulty of endorsing an item and scale thresholds unique to each item, as well as the response patterns of the individuals completing the survey and the amount of the attitude in the individual based on empirical evidence (Andrich, 1988; Embretson & Reise, 2000; Krueger & Finger, 2001; Santor & Ramsay, 1998). The expectation of the Rasch model is that a person endorsing a more extreme statement has a higher probability of endorsing less extreme statements (Wright & Masters, 1982). Considering school belonging, an expectation of the model for an item is that the probability of endorsing the item in the keyed direction increases as the amount of the individual's school belonging increases.

Both person and item estimates allow researchers to determine how well an item measures a latent construct. As suggested by Bond and Fox (2001), here the consideration is if the rating scale has aided in the collection of reliable data for persons and items, if the categories fit the model sufficiently well, if the thresholds indicate a hierarchical pattern to the rating scale and if there are enough data in each response category to provide stable estimates. This study will employ this model to examine the fit and function of the school belonging measure and make recommendations for any revisions.

#### Purpose

As noted above, school belonging measures investigate whether students feel like they fit in at their school. The purpose of this study is to apply the Rasch Rating Scale model to examine the fit and function of the school belonging scales based upon the data collected from Latino students, as described above. Applying a Rasch measurement model enables us to investigate the stability of these measures and make recommendations to improve the quality of the school belonging scales. These results will be presented to the members of the research team that were

part of the data collection process. The results of this study may also guide others utilizing survey research methods to improve their school belonging measures.

### Methods

The school belonging scales were created to measure students' sense of school belonging. These measures were administered as part of a larger study being conducted by Dr. Christia Brown. Pilot test data collected from lower elementary Latino students during the Spring of 2009 was used to conduct the Rasch analysis on the school belonging scales.

### Response Frame

The sample examined in this study included lower elementary Latino students from a southeastern city. Students were classified as Latino according to school records of students' ethnicity. Investigating school belonging with Latino students is important because research suggests minority students may benefit more from a sense of school belonging when compared to Whites (Nichols, 2006). Parental consent was obtained for the students who participated, in addition to verbal assent from the students. After consent was obtained the surveys were read to the students by university graduate and undergraduate students. Before the surveys began the university students showed the students a thermometer that had four different markings; this instrument was used to explain the different choices on the response scales. Subsequently the university students read the surveys to the students and marked the students' responses to each item.

### Instrumentation

The school belonging survey was constructed based upon various surveys including the School Success Profile (Bowen & Richman, 2008), the Elementary School Success Profile (Bowen & Richman), the Psychological Sense of School Membership 2 Scale (Nichols, 2006),

and the Friendship Quality Questionnaire (Parker & Asher, 1993). This school belonging survey combined a variety of scales to create a new scale that will hopefully better capture a student's sense of belonging at school.

The survey consisted of questions about students' relationships with their teachers and peers. It also included questions about students' overall sense of school belonging. Not all items used the same response scale, but a four point scale was employed by all items.

### Data Analysis

Using WINSTEPS version 3.65.0 software, a rating scale model was applied beginning with students and items to test the overall fit of data to the model. Survey data was analyzed using the rating scale model to investigate the overall construct of school belonging. Missing data was treated as missing without imputing means or other substitutes since respondents may not be able to answer all survey items with integrity.

Survey items and respondents that did not adequately fit the model requirements were identified using the mean square scores, within a commonly accepted range of 0.6 to 1.4 for a rating scale structure (Wright & Linacre, 1994). Inspecting the outfit mean-squares provides evidence about fit of data to the model. The infit mean-squares are used to determine fit of the item within the construct.

The guidelines outlined by Linacre (2004) were used to evaluate the rating scale category effectiveness based on responses. Point-biserial correlations were inspected to investigate the orientation of the latent variable to ensure that the polarity of the items were of the same sign, or direction (i.e. all point-biserial correlations were positive). The number of observations and distribution of observations across categories were examined to describe the functioning of the rating scale categories. Advancing average measures with each category and step calibrations

ensures the rating scale measure is stable and accurate. Probability curves will be used to visually inspect the rating scale category function.

### Results and Discussion

During the revision process, it is important to inspect the instrument used to measure school belonging to determine its adherence to basic survey principles prior to examining it empirically through rigorous analysis. The items referring to school belonging can be classified in three subtopics: teacher relationships, peer relationships, and general sense of belonging. The first recommendation is to put all items corresponding to each subtopic in its own section. Currently, the instrument has items corresponding to general sense of belonging and teacher relationships in the same section. The teacher relationship items in the first section should be relocated to the section entitled "You and Your Teacher". Another recommendation is, if possible, to make the rating scales consistent across all items. Also two sections of items contain questions all beginning with the phrase "How often" while the other items are statements. It would make sense to make the delivery consistent, either all questions or all statements.

In order to make valid interpretations, fit of the data to the model must be inspected. The only items included in this analysis are the survey items classified as providing information regarding a sense of school belonging. According the guidelines provided by Linacre (2004), each rating scale category must have at least 10 observations in order for interpretations to be made about the stability of the rating scale. This was not the case for the response categories *not at all true* and *not much* from both rating scales. However, utilization of the rating scale is consistent with the analysis of the full instrument where it is not fully being utilized by the respondents. Seventeen of twenty-four items used three rating scale categories or less to respond to the items. The first nine school belonging items employ a rating scale of *not at all true, a little*

*true*, *medium amount true*, and *very true*. Based on empirical evidence of the entire survey instrument, the rating scale category *medium amount true* is being absorbed by *a little true* and *very true*. The analysis with just the school belonging items shows each rating scale category reaching a peak even though the response *not at all true* was chosen only four times. Similarly, the rating scale category *not much* and *a little* was not fully utilized by respondents for the remainder of the survey items to merit including both categories. Optimizing the use of the rating scale is essential for stable and accurate measures of respondents' sense of school belonging. Researchers should consider collapsing the rating scale categories from a four point to a three point Likert-type scale in order to employ a rating scale that is functioning as expected and is fully utilized by respondents.

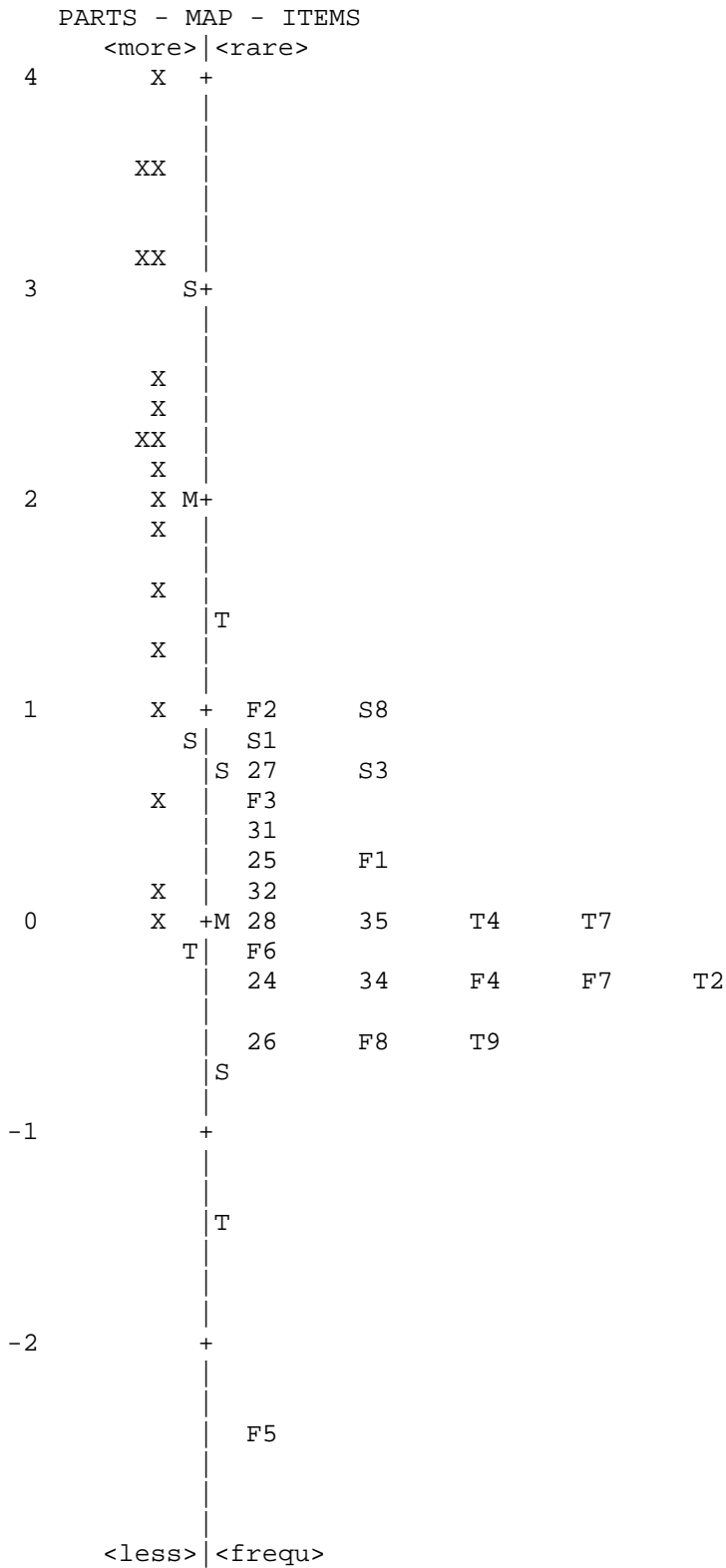
Person and item reliability and separation statistics are also an essential component to a quality measure. For example, item estimates indicate whether items are able to make distinctions among respondents in their sense of school belonging. Person reliability and separation estimates (0.77 and 1.97 respectively) were acceptable for further interpretations of the data using this model. Item reliability and separation estimates (0.49 and 0.99 respectively) were considerably lower, but could be attributed to the homogeneity and small number (n=18) of respondents. Since we are using this analysis to provide initial calibrations to guide revisions toward a stable and accurate measure of sense of school belonging, the inspection of fit of data to the model will continue with inspecting point biserial correlations and fit statistics.

The point-biserial correlation followed by infit and outfit mean-square statistics were examined to highlight any problematic items. Point-biserial correlations are inspected to investigate the orientation of school belonging to ensure that the polarity of the items were of the same sign, or direction. All items related to school belonging resulted in positive point-biserial

correlations. An item may be considered problematic with a high outfit statistic indicating misfit of the data to the model while a high infit statistic indicates lack of item fit within the construct, school belonging. Five of twenty-four items intended to measure sense of school belonging were highlighted for high fit statistics (mean-squares greater than 1.4). The item with only a high outfit statistic was "*I feel that the adults at school respect my ideas.*" Two items with high outfit and infit statistics were both in the section entitled "You and Your Friends." These items were "*My friends would stick up for me if other kids made fun of me*" and "*My friends and I tell each other about our problems.*" Finally the two items resulting in only high infit statistics include the items "*I can be myself at school*" and "*How often do you feel the teachers care about you?*"

By examining the principal contrasts, the items can be examined to determine if general sense of belonging, teacher relationships, and peer relationships need to be regarded as separated constructs. The principal contrast attributed to the greatest amount of unexplained variance consists of five teacher relationship items against five peer relationship items. Therefore, this finding suggests teacher and peer relationships need to be considered as separate constructs within school belonging. This gives even more support for separating items corresponding to these constructs in their own section of the instrument. Figure 1 illustrates the item map from easy to endorse (bottom) to difficult to endorse (top). Most of the items are clustered around the item mean, which is nearly two standard deviations below the person mean. In other words, this survey instrument overall was easy to endorse for respondents. The item "*I have friends I can talk to at school*" was the easiest item to endorse. Based on this information, the recommendation would be to better span the students' sense of school belonging and create items that can distinguish better the sense of school belonging for respondents. The X's on the left-hand side without items on the right-hand side of the map illustrates this need.

Figure 1. Item and person map of school belonging items



### Conclusion

The purpose of this study was to determine whether the school belonging scales were functioning the way they were intended by applying the Rasch Rating Scale model (Andrich, 1978) on the pilot test data. The Rasch analysis of the data will guide revisions to the instrument by highlighting any problematic or confusing statements prior to the larger study of over 400 students in the county.

Specifically, the items will be rearranged on the survey so that all of the items measuring the same construct will be together. The grouping of all of the items of one construct will allow students to answer related questions simultaneously rather than having to re-examine similar concepts multiple times throughout the survey.

The response scales will be examined to determine whether it is possible to collapse the items into a three point scale and to create a common rating scale. The scales need to be collapsed because the students were not fully using the four point scale. This may have been because there were not clear distinctions between the four response choices. The scales will also be examined to determine a common rating scale so that students do not have to use multiple rating scales throughout the survey.

Any items that had high fit statistics will be looked at to determine whether they should be re-worded or discarded. Specifically, the item "*I feel that the adults at school respect my ideas*" may not have fit because the other items examined students' relationships with their teachers and not general adults at the schools. The items "*My friends would stick up for me if other kids made fun of me*", and "*My friends and I tell each other about our problems*" had high outfit and infit statistics. These items need to be examined to see whether the wording was a problem, or whether these items are not properly tapping the construct of friendship in the

student sample. Two items had high infit statistics. The first item was "*I can be myself at school*" which may be problematic because students feel that they can "be themselves" but this may not necessarily mean that they feel like they belong at their school. The other item with a high infit statistic was "*How often do you feel the teachers care about you*" which may be problematic because feelings are subjective and teacher care may be perceived in different ways.

Finally, items will be created that better differentiate students on their sense of school belonging since the items were easy to endorse for many of the students. This is problematic because the students easily agree with the items which means the scale is not going to clearly differentiate between students on the belonging construct. Questions need to be written that will be more difficult to endorse so that the items can better define differences in school belonging.

School belonging is important construct for a variety of reasons. Osterman's (2000) review demonstrated that school belonging has been linked not only to a variety of academic outcomes including school engagement and dropout, but to other outcomes as well including participation in school activities and interacting with others in prosocial ways. Since school belonging is an important construct, it is imperative to measure it appropriately. As can be seen from this study, there are various ways to improve the school belonging scales. The revisions suggested in this paper will aid in improving the stability and accuracy of the measures of school belonging and can guide other researchers studying this construct in the design of their instruments.

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