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The Milwaukee Youth Belongingness Scale (MYBS): Development and Validation of the Scale Utilizing Item Response Theory

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The examination of belonging in schools, connecting school belonging to a plethora of academic and psychosocial outcomes, has been well established in the literature. Researchers have measured school belonging most frequently with the Psychological Sense of School Membership, but its psychometric properties have been called into question by several researchers. Further, the scale measures 1 subset of belonging (i.e., school), leaving out powerful belonging connections in other areas of a student's life, namely peers and family. The current study examines the development and validation of the Milwaukee Youth Belongingness Scale. This process was examined by utilizing item response theory and a secondary analysis confirming the factor structure and the validation of the scale by comparing it to other constructs. The results confirm a 9-item scale that involves a total scale score and 3 factors (School, Peers, Family). Implications for mental health professionals and future research are discussed.

Impact and Implications

The current study establishes a strong measurement tool to evaluate youth's sense of belonging in crucial areas of their life (family, peers, school). This tool will allow school mental health and educational professionals an opportunity to identify students who may find themselves on the margins and isolated feel connected in and outside of the school community. Further, the measurement tool can aid educational administrators in gaining a greater understanding of their school climate.

Keywords: scale development, belonging, item response theory

Over the past several decades, the importance of belonging in academic settings has been examined thoroughly in the educational and psychological literature, emerging as a salient construct in understanding educational and psychosocial outcomes for school-age youth (Goodenow, 1993; Slaten, Ferguson, Allen, Brodrick, & Waters, 2016; Green, Emery, Sanders, & Anderman, 2016; Gummadam, Pittman, & Ioffe, 2016; Osterman, 2000). The experience of belonging in academic settings has been found to be adaptive for youth and related to a myriad of positive educational outcomes, including well-being, academic performance, school attendance, academic achievement, school retention, goal setting, and psychological adjustment (Anderman, 2003; Duru, 2007; Goodenow, 1993; Goodenow & Grady, 1993; Ryan & Deci, 2000). Further, an increased sense of belonging has served as a protective factor against a number of psychological concerns, including depression, violence, loneliness, substance abuse, and anxiety (Booker, 2006; Cemalcilar, 2010; Galliher, Rostosky, & Hughes, 2004; Hagerty, Williams, Coyne, & Early, 1996; Osterman, 2000; Pittman & Richmond, 2008). Although one can experience a sense of belonging in any formal or informal environmental setting (Baumeister & Leary, 1995), some domains of belongingness have resulted in more positive outcomes for youth. These overarching domains include school, peer, and family belongingness.

The measurement of one type of belonging, school belongingness, has consistently utilized the Psychological Sense of School Membership (PSSM) scale (Goodenow, 1993). Although the PSSM has been used in a number of studies to assess a respondent's sense of school belongingness (e.g., Rose, Espelage, Monda-Amaya, Shogren, & Aragon, 2015), others have noted potential limitations with the factor structure, internal validity, and length of the scale (Abubakar et al., 2016; Ye & Wallace, 2014; You, Ritchey, Furlong, Shochet, & Boman, 2011). Additionally, the PSSM measures one specific domain of belongingness (i.e., school belonging) but does not account for the other salient domains of belongingness experienced by school-age youth through subscales (i.e., peer, family). The PSSM contains items that address peer relationships but does not account for these experiences as separate but additive constructs. Although the literature on peer and family relationships is expansive, the discussion and measurement of membership within peer or family groups has been relatively sparse. Therefore, the purpose of the current study was to develop and validate a scale that measures youth belongingness within multiple life domains, including school, peer, and family.

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Further, the goal of the measure is to identify a usable scale with a sound factor structure that is both valid and reliable.

Conceptualization of Belonging

The construct of belonging can be traced to Maslow's (1943) "Theory of Human Motivation." Maslow noted that the fundamental need for love and belongingness is the second most important need for human behavior, preceded by only physiological needs and personal safety. The level of importance placed upon one's need to belong would engender a body of research devoted specifically to this particular source of motivation (Baumeister & Leary, 1995; Rogers, 1951).

Baumeister and Leary (1995) built upon Maslow's (1943) early work to elaborate on the construct of belonging. They defined *belonging* as a need to develop significant consistent interpersonal relationships within a group. A key component of Baumeister and Leary's theory argues that the construct of belongingness can be satiated, meaning that if one feels a sense of belonging anywhere, this satisfies the need to belong as a whole or increases the likelihood of one feeling a sense of belonging in other settings. This idea suggests that there are multiple settings in which an individual can feel a sense of belonging.

Research has evaluated the construct of belonging across multiple age groups (Slaten, Elison, Deemer, Hughes, & Shemwell, 2017; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Poulton, Caspi, Milne, et al., 2002); however, within the last few decades there has been a growing amount of literature focused on school-age children (Goodenow, 1993; Goodenow & Grady, 1993; Slaten et al., 2016). For this particular population, belonging has been shown to be a significant construct and has been studied within a number of settings (i.e., family, peer, and school; Goodenow, 1993; Slaten & Baskin, 2014; Van Ryzin, Gravely, & Roseth, 2009). Among school-age youth, belonging has been linked to academic achievement, academic motivation, adjustment, career decision-making, dropout prevention, social acceptance, and transition (Anderman, 2002; Freeman, Anderman, & Jensen, 2007; Goodenow & Grady, 1993; Kuperminc, Darnell, & Alvarez-Jimenez, 2008; Pittman & Richmond, 2008; Slaten et al., 2016; Van Ryzin et al., 2009).

Measuring Belonging

Although belonging is mentioned frequently in educational and psychological literature, there have been challenges to researching the construct among youth. Among these challenges has been a lack of consistency in the terms used to describe belonging, the quantifying of qualitative information, and a narrow lens on the wide construct that is belonging. To begin, there has been some confusion among terms used by researchers. Belonging can be found in the literature on attachment, connectedness, and social support (Hallinan, 2008; Jose, Ryan, & Pryor, 2012; Libbey, 2004; Van Ryzin et al., 2009). Previous studies have used these terms interchangeably or suggested one may be a subtheme to measure a larger construct (Libbey, 2004; McNeely & Falci, 2004). However, the literature has suggested these constructs are most likely separate. For example, *attachment* has been referred to as the social and emotional ties that individuals share with others (Wehlage, 1989). *Connectedness* has been defined as a sense of companionship and connection in a large social context that extends across diverse backgrounds (Kohut, 1984). The literature has suggested that connectedness develops during adolescence and exists in context beyond school and family (Lee & Robbins, 1995; Slaten et al., 2016). Research has defined *social support* as " resources provided by other persons" (Cohen & Syme, 1985, p. 4). Despite the similar, overlapping, or even interrelated nature of the constructs mentioned, belonging is a separate construct and measures a specific perception that is not captured by these other constructs, namely a perceived experience of consistent interaction and persistent caring from others, usually as a part of a group.

Belonging to peers and peer relationships in general may be viewed as a different type of belonging independently impacting outcomes. Green and colleagues (2016) conducted a qualitative study attempting to understand middle school students' perspectives on belonging in the classroom. The conclusion of this examination suggested that for these students specifically, there was a separation between academic and social belonging, and both were salient for students but were defined as two distinct constructs. Therefore, it is reasonable to conclude that perhaps school belonging overall may include peer belonging, but peer belonging is also a construct that should be examined independently as well.

Limitations of the Psychological Sense of School Membership (PSSM)

The most widely used measure of school belonging among youth populations is the PSSM (Goodenow, 1993). Despite the popularity of the PSSM, studies have shown the scale to have several limitations (Hagborg, 1998; Ye & Wallace, 2014; You et al., 2011). Specifically, several scholars have noted the factor structure of the PSSM as concerning (Abubakar et al., 2016; You et al., 2011). Abubaker and colleagues (2016) summarized all of the psychometric studies that have been completed on the PSSM and concluded that these studies demonstrate mixed results, suggesting two or three different factor solutions. Further, Goodenow (1993) did not verify the proposed factor structure in the development of the PSSM (Ye & Wallace, 2014). In addition to mixed results regarding the number of factors for the scale, You and colleagues (2011) concluded that the unidimensionality of the scale may not be appropriate, based on their attempt to replicate the psychometrics of the scale. The PSSM is an 18-item scale (Goodenow, 1993), and research has shown that as the length of the questionnaire increases, the response rate and accuracy of the measure decreases (Galesic & Bosnjak, 2009). Last, the PSSM is derived not from the theoretical framework of belonging (Baumeister & Leary, 1995; Maslow, 1943) but from the framework of school attachment and membership (Libbey, 2004).

Limitations of Classical Test Theory (CTT)

In addition to the limitations of the PSSM (Goodenow, 1993) in measuring youth belonging, there are limitations to the scale development theory that was utilized to develop them, classical test theory (CTT). CTT is most commonly utilized because of the ease with which it can be interpreted and does not require significant statistical assumptions. However, CTT does assume that participants have both observed scores and true scores, the observed score being an estimate of the true score plus measurement error. Therefore, the theory is dependent on the content of the scale and participants studied, not an absolute characteristic of the items

studied or the participants. In conclusion, these concerns can make it difficult to compare between groups or across different instruments measuring other constructs.

In contrast, item response theory (IRT) overcomes several of these shortcomings and is considered a more accurate and rigorous methodology to utilize in scale development. The most important contributions of IRT are regarding item and participant invariance. For instance, the degree to which individuals feel as though they belong is independent of the characteristics of the items in the measure. When utilizing IRT, the item descriptors do not depend on the participant sample, and thus the results can be generalizable.

Current Study

The targeted nature of the PSSM (Goodenow, 1993) is specific to school belonging, whereas our goal was to establish a measure that is both valid and reliable in measuring belonging across three salient domains in a youth's life: school, peers, and family. Although school belonging is a valuable, independent construct, it does not capture critical facets of life beyond a student's educational environment. As stated previously, Baumeister and Leary's (1995) belonging hypothesis theory suggests that a sense of belonging in any setting may satisfy the need and satiates a lack of belonging elsewhere. Therefore, it is important to establish a valid and reliable measure of belongingness across an individual's critical life domains. The current study examines a measure, the Milwaukee Youth Belongingness Scale (MYBS; Slaten, Thomas, & Baskin, 2008), that has been utilized sparingly in the literature but has minimal psychometric information to validate the scale. The scale was originally developed from Baumeister and Leary's concept of belonging and considers belonging across the most salient domains in a youth's life: family, school, and peers. Further, we utilize IRT, as opposed to CTT, to evaluate the measurement items for a solidified factor structure and a more comprehensive understanding of the validity and reliability of the scale.

Method

Participants

Participants for the current study were drawn from pre- and postassessments of school climate in two rural middle schools in the Midwest. Schools were selected due to their comparability on several factors, including rural status ($n \approx 12{,}500$), proximity to a larger city ($n \approx 40$ miles), number of schools (i.e., one elementary, one middle, and one high school), total middle school student population ($n \approx 500$), and student demographics (e.g., race−ethnicity distribution, percentage of students who receive free or reduced-price lunch, percentage of students who receive special education services). Participants in the preassessment (Study 1) included 909 students ($n = 458$ from School 1; $n = 451$ from School 2) in Grades 6 ($n = 331$), 7 ($n = 284$), and 8 ($n = 294$). The racial distribution during preassessment included 83.1% White or European American ($n = 755$), 10.6% Black or African American ($n = 96$), 5.0% Hispanic or Latino/a ($n = 45$), 1.1% Asian or Asian American ($n = 10$), and .3% Native American ($n = 3$), with a total gender distribution of 50.8% male ($n = 462$) and 49.2% female ($n = 447$). Participants in the postassessment (Study 2) included 864 students ($n = 436$ from School 1; $n = 428$ from School 2) in Grades 6 ($n = 314$), 7 ($n = 269$), and 8 ($n = 281$). The racial distribution during postassessment included 83.0% White or European American ($n = 717$), 10.4% Black or African American ($n = 90$), 5.0% Hispanic or Latino/a ($n = 43$), 1.3% Asian or Asian American ($n = 11$), and .3% Native American ($n = 3$), with a total gender distribution of 50.9% male ($n = 440$) and 49.1% female ($n = 424$). In total, 971 students participated in the pre- and postassessments, with 802 (82.6%) completing both pre- and postassessment, 107 (11.0%) completing only the preassessment, and 62 (6.4%) completing only the postassessment. Additionally, due to missing data on study measures, one student was removed from consideration in Study 1 and 12 students were removed from consideration in Study 2, resulting in samples of 908 and 852, respectively.

Procedure

Following a professional development workshop for state, district, and local school administrators regarding bully prevention and intervention, which was facilitated by the second author, two rural middle school principals and their respective superintendents reached out to the second author to assist in the development of a schoolwide climate assessment. Therefore, over the course of the 2014–2015 academic year, as a service to the schools, the second author worked with district administration to create a needs-based assessment that was grounded in constructs that each district found to be critical to its students' success, which included constructs related to belongingness, social supports, externalizing and internalizing behaviors, bullying involvement, and resiliency. Once the assessment was crafted, each school established a plan for distribution and completion for the 2015–2016 academic year. As a function of each school's existing schedules, the assessments were completed during a preestablished period (e.g., advisory period) in early October 2015 and mid to late May 2016, where teachers distributed the assessments (paper and pencil) and were available to answer questions; provide item clarification; prompt students for completion; and, if necessary, read items aloud. Once the assessments were complete, they were delivered to a designated school official, who ensured all data were deidentified prior to submission to the second author. The deidentification process included assigning students a unique identification number, which was derived by school officials and maintained on a separate spreadsheet that was available to only school administration. The purpose of assigning these unique identifiers was to connect the pre- and postassessments, while increasing the confidentiality of responses. Because the data were deidentified, the assessment was part of the schools' daily curriculum, and the second author did not participate in assessment distribution or implementation; this secondary data analysis was deemed exempt by the second author's institutional review board.

Measures

Milwaukee Youth Belongingness Scale. The Milwaukee Youth Belonging Scale (MYBS) was originally developed as a 24-item scale used to measure participants' perceptions of belonging across multiple areas of life (Slaten et al., 2008). The scale is divided into three subscales of family, peer, and school belongingness. Each subscale includes eight items designed to assess for perceptions of belongingness within the corresponding domain. Previous studies in which it has been utilized have shown appropriate levels of

internal reliability for the total MYBS as well as for the three subscales, with Cronbach's alpha coefficients ranging from .83 to .93 (Slaten et al., 2016). The total sample for the current study, on the initial MYBS scale, resulted in Cronbach's alpha levels of .83 for family belongingness, .80 for school belongingness, and .75 for peer belongingness.

Child and Youth Resilience Measure–28. The 28-item Child and Youth Resilience Measure (CYRM-28) measure is designed to assess childhood resiliency. Items were answered using a 5-point Likert scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). The CYRM-28 (Ungar & Liebenberg, 2011) was tested with samples from multiple countries to assure face and content validity across a wide variety of cultures (Cronabach's $\alpha = .88$). The total score of the CYRM-28 is the sum of the three components related to the construct: individual, relational, and contextual. For the sake of this study, only the individual subscale was utilized. The total sample for the current study on the individual subscale resulted in a Cronbach's alpha level of .87.

University of Illinois Bully Scale. The University of Illinois Bully Scale was used to assess for behaviors related to bullying such as name-calling, rumor spreading, social exclusion, and teasing (Espelage & Holt, 2001). Participants are asked to self-report the frequency with which they engaged in behaviors related to bullying within the last 30 days. The scale consists of eight items, with response options ranging from 1 (*Never*) to 5 (*7 or more times*). Previous studies have found appropriate levels of internal reliability, with the Cronbach's alpha coefficient ranging from .83 to .84 (Rose, Stormont, et al., 2015). The total sample for the current study resulted in a Cronbach's alpha level of .85.

University of Illinois Victimization Scale. Victimization by peers was assessed using the four-item University of Illinois Victimization Scale (Espelage & Holt, 2001). Students were asked to self-report how often other students called them names, made fun of them, picked on them, and pushed or hit them in the past 30 days. Response options range from 1 (*Never*) to 5 (*7 or more times*). Previous studies have found appropriate levels of internal reliability, with the Cronbach's alpha coefficient ranging from .83 to .79 (Rose, Espelage, et al., 2015). The total sample for the current study resulted in a Cronbach's alpha level of .80.

Weinberger Adjustment Inventory. Self-esteem was assessed using four items from the Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990). Students were asked to respond to items that assessed their feelings of self, including "I feel I'm the kind of person I want to be" and "I am a special or important person." Response options ranged from 1 (*Never*) to 5 (*Almost Always*). Previous studies have found appropriate levels of internal reliability, with the Cronbach's alpha coefficient ranging from .79 to .74 (Rose, Slaten, & Preast, 2017). The total sample for the current study resulted in a Cronbach's alpha level of .74.

Vaux Social Support Record. The Vaux Social Support Record (VSSR; Vaux, 1988) is a nine-item questionnaire that is an adaptation of Vaux and colleagues' (1986) Social Support Appraisals' 23-item scale that was designed to assess the degree to which a person feels cared for, respected, and involved. The VSSR is composed of three subscales of three items each that measure the support available from family, peers, and school. Scores range from 0 to 6 on each subscale, and 0 to 18 on the total scale, with higher scores indicating greater perceived support. A sample item is "I have friends I can talk to, who care about my feelings and what happens to me." Vaux and colleagues reported strong internal consistency, with Cronbach's alpha levels ranging from .80 to .90 across the separate subscales. The total sample for the current study resulted in Cronbach's alpha levels ranging from .70 (i.e., school) to .78 (i.e., family, peers).

Results

Study 1: Scale Revision and Exploratory Factor Analysis

The first step in constructing a psychometrically sound measure of belongingness was to develop and administer the current version of the instrument. The initial scale included 24 items that covered three domains of belongingness (family, school, and peers) with eight items per domain. All items utilized a 4-point Likert-type response scale ranging from 1 (*Disagree*) to 4 (*Agree*). Data were gathered by administering the initial scale to the sample described previously.

The data were first examined according to classical test theory. Cronbach's alpha coefficient (Cronbach, 1951) for the 24-item instrument was .87, indicating that the initial iteration of the belongingness scale was sufficiently reliable. However, it is known that redundant items may artificially inflate alpha, and many of the original items had substantially overlapping content. Thus, we carried out a more in-depth analysis of the full instrument using IRT.

All response scales were ordinal, so each item was fit with a graded response model (GRM; Samejima, 1997) using the *mirt* package (Chalmers, 2012) in the R statistical software program (R Development Core Team, 2016). This IRT model is used to describe the probability of endorsing a certain response option (e.g., *Disagree*), conditional on each respondent's location along the latent trait continuum (e.g., the person's degree of belongingness). The GRM is a polytomous IRT model, which means that it provides a different response probability regarding each of the ordered response options of each item, thereby allowing researchers to draw nuanced conclusions from their data. Statistical details regarding the GRM are provided in most IRT texts (e.g., Embretson & Reise, 2000); for the purposes of this study, it is important to note that the GRM provides an estimates an overall item discrimination (a) parameter a (indicating the degree to which the item differentiates between respondents of low and high belongingness) and $k - 1$ category threshold (b_k) parameters (indicating the boundaries between the response probability function associated with each of the k response options). Adequate discrimination is represented by a parameter estimates of .8 or higher (de Ayala, 2009), and the $b_{k\text{-}1}$ parameters should be fairly evenly dispersed within a reasonable range of the latent trait (e.g., -3 to $+3$).

After fitting the GRM to the initial data, we used the results for item analysis. As a first step, we examined the a parameter estimates associated with each item. Low item discrimination makes it difficult to discern whether respondents, given their degree of belongingness, are more likely to agree or disagree with the item prompt. Three of the original items were found to have especially low discrimination parameter estimates (well below .8) and were therefore removed from further analysis.

Our next step involved an examination of the IRT assumption of local item independence, which holds that there are no residual correlations between items. Local dependence violations are especially problematic because redundant items can artificially inflate

the reliability of the instrument. Violations of this assumption were inspected via the LD χ^2 index (Chen & Thissen, 1997). Of the 276 item pairs on the first test, the LD χ^2 analysis detected 20 pairs that were excessively correlated. These pairs were examined according to item content and alignment with belongingness theory, and individual items (or in some cases both items) from each pair were then removed from the scale.

The resultant form consisted of the nine items that are paraphrased in the first column of Table 1. The nine-item belongingness scale produced an alpha coefficient of .78; that is, we eliminated more than 60% of the original 24 items and lost only .09 in terms of Cronbach's alpha. Although deleting the redundant items caused a slight decrease in internal consistency, an alpha coefficient of .78 demonstrates that sufficient reliability has been maintained. Further, it is our opinion that the benefits of the current form (e.g., ease of scoring and interpretation of factors, reduction of test taker fatigue) justify the negligible cost in internal consistency.

The next step was to investigate the structure of the nine-item scale by utilizing exploratory factor analysis. Note that factor analysis was considered here to identify the proper data structure for subsequent IRT analyses. The first four eigenvalues were 4.23, 1.13, 1.10, and .62, thereby suggesting a three-factor solution, though for completeness, we also considered unidimensional and two-factor structures. Each of these structures was fit to the data by specifying robust weighted least squares estimation and oblique (geomin) rotation in Mplus 7.0 (Muthén & Muthén, 2012), and the chi-square goodness-of-fit statistic was used to determine which structure best represented the data.

Although the factor loadings (presented in Table 1) were fairly high for the unidimensional and two-factor solutions, the fit statistics did not support either of these structures. The three-factor solution, however, demonstrated excellent fit, $\chi^2(12, N = 906) = 10.17$, $p > .05$. More important, the three-factor solution provided an easily interpreted structure wherein Factor 1 comprised the family items, Factor 2 comprised the peer items, and Factor 3 comprised the school items, with overall loadings ranging from .53 to .85. A four-factor solution was not considered because the three-factor solution achieved a chi-square statistic greater than .05 and because the limited degrees of freedom would prohibit a four-factor solution.

The interfactor correlations shown in Table 1 revealed that the three factors were fairly, though not excessively, correlated. Thus, we investigated the appropriateness of fitting an item bifactor model (Gibbons & Hedeker, 1992) to the nine-item scale. The bifactor model is an increasingly popular approach to measurement (see Reise, 2012), wherein the items constituting a scale are hypothesized to reflect an overall latent dimension (or "general factor") along with several clusters of dimensions (or "specific factors") that have shared content. In the present case, a bifactor model was considered because the full MYBS was designed to measure respondents' overall sense of belonging, whereas multiple clusters of items were intentionally included to assess the three specific types of belonging. Figure 1 uses standard measurement model diagramming conventions (in which rectangles represent observed item responses, circles represent latent dimensions, and arrows represent relationships between the observed and latent variables) to visualize the MYBS bifactor model. Note that, to examine the psychometric properties of each MYBS item, the following bifactor analysis was conducted within the IRT framework rather than the ordinal factor analytic framework.

Table 1
Factor Loadings, Communalities, Correlations, and Goodness-of-Fit Statistics of the Unidimensional, 2-Factor, and 3-Factor EFA Solutions

	1-factor[a]		2-factor[a]			3-factor[a]			
Variable	1	h^2	1	2	h^2	1	2	3	h^2
Item									
1. Comfortable around family	.74	.55	.80		.64	.78			.67
2. Family spend time with me	.74	.55	.87		.69	.84			.71
3. Family accepts me	.81	.66	.78		.71	.76			.74
4. Get along with peers	.66	.44		.82	.60		.85		.69
5. Liked by peers	.70	.48		.75	.59		.65		.58
6. Enjoy time with peers	.63	.40		.70	.49		.63		.49
7. Adults at school like me	.54	.29	.31	.30	.30			.82	.56
8. Adult at school cares	.57	.33	.43		.34			.66	.48
9. Enjoy going to school	.51	.27	.29	.29	.27			.53	.34
2-factor correlations									
1. Family belongingness			—						
2. Peer belongingness			.60	—					
3-factor correlations									
1. Family belongingness						—			
2. Peer belongingness						.52	—		
3. School belongingness						.57	.48	—	
Goodness of fit									
χ^2	468.99		255.98			10.17			
df	27		19			12			
p	<.001		<.001			.60			

Note. $N = 906$. EFA = exploratory factor analysis.
[a] 1, 2, and 3 in the column headings refer to the family belongingness, peer belongingness, and school belongingness factors, respectively. Factor loadings < .25 are not displayed. h^2 is the communality estimate.

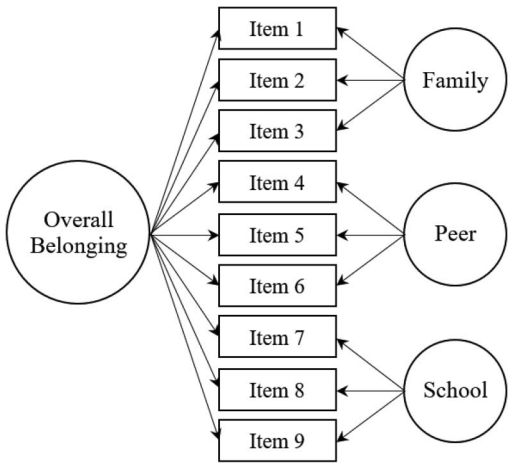

Figure 1. A diagrammatic representation of the bifactor model of the nine-item Milwaukee Youth Belongingness Scale.

The confirmatory item bifactor model was specified in the *mirt* package (Chalmers, 2012) and estimated using the MH-RM algorithm (Cai, 2010); results are displayed in Table 2. This table presents the a parameters of the general and specific factors and the b_k parameters, as estimated by fitting the multidimensional extension of the GRM (de Ayala, 2009) to the MYBS data. All nine items discriminated well regarding the general factor of overall belongingness: Discrimination parameters ranged from 1.08 to 2.73, indicating that the MYBS excels at differentiating between respondents of low and high overall belongingness. The specific factors also exhibited high discrimination parameters, except for Item 9 (a_4 = .74); however, this moderately discriminating item was retained to keep the bifactor structure intact.

Regarding the category threshold parameters, all nine items yielded low thresholds between the lowest response options ($\overline{b_1} = -2.05$), meaning a response of *Disagree* was likely among only individuals with extremely low levels of belongingness. At the high end of the response scale, the thresholds exhibited a broader range of difficulty. For example, the threshold between *Somewhat Agree* and *Agree* was low for Item 3 ("Someone in my family accepts me for who I am"; $b_3 = -1.01$) but somewhat high for Item 9 ("I enjoy going to my school"; b_3 = .82). Overall, the nine items on the MYBS tended to focus measurement on the lower end of the belongingness scale.

Next, we considered one of the more important features of IRT modeling: item and test information. In IRT, information refers to measurement precision, that is, the confidence we had in our estimates of each respondent's degree of the latent trait. At the test level, our nine-item scale provided the most accurate measurement of belongingness when the respondent was 1−2 *SD*s below average. Information was relatively low for respondents with an average degree of belongingness (i.e., at the 0 point of the latent trait scale) and nearly absent when the degree of belongingness was 1 *SD* above average or higher.

Unfortunately, IRT model evaluation via goodness-of-fit assessment can be difficult due to sparseness in the contingency table of response pattern probabilities (Bartholomew & Leung, 2002); this complication is further exacerbated when data are polytomous (Maydeu-Olivares, 2013). Thus, to evaluate the bifactor model of the MYBS, we fit the data with an ordinal factor analysis model. The results, which were obtained via robust weighted least squares estimation in Mplus 7.0 (Muthén & Muthén, 2012), are shown in Table 3. The factor loadings reveal the same pattern of results as indicated by the IRT discrimination parameters presented earlier (and in fact, discrimination parameters can be directly transformed to factor loadings; see Bock, Gibbons, & Muraki, 1988). The model fit, as indicated in the note at the bottom of Table 3, was excellent. We acknowledge that the bifactor model has an inbuilt tendency to fit well (Bonifay, Lane, & Reise, 2017). In this study, however, the bifactor model was not selected simply because it fit the data better; it was selected because the factor loading pattern is precisely aligned with the belongingness theory underlying the instrument.

Finally, the bifactor model was evaluated relative to two models that may be candidates for the structure of belongingness: a unidimensional (i.e., general belongingness, with no specific factors) model and a three-factor (i.e., family, peer, and school belongingness, with no general factor) model. Unfortunately, the ordinal nature of the data prohibited the use of likelihood-based relative fit statistics like Akaike information criteria and Bayesian information criteria, and formal tests of the chi-square difference between these models was not possible because the three-factor model included correlated dimensions and is therefore not nested within the bifactor model. However, the chi-square statistics of each model, as presented in Table 4, demonstrate that, among these

Table 2
Bifactor Graded Response Model Item Parameters

Item	General factor a_1	Specific factors			Category thresholds		
		Family a_2	Peer a_3	School a_4	b_1	b_2	b_3
1. Comfortable around family	2.14	1.36			−2.26	−1.60	−.80
2. Family spends time with me	2.32	2.03			−2.06	−1.35	−.48
3. Family accepts me	2.73	1.51			−2.12	−1.68	−1.01
4. Get along with peers	1.73		1.79		−1.98	−1.29	.01
5. Liked by peers	1.76		1.24		−2.17	−1.41	−.12
6. Enjoy time with peers	1.39		1.11		−2.37	−1.56	−.36
7. Adults at school like me	1.30			1.50	−1.69	−.83	.47
8. Adult at school cares	1.32			1.07	−2.14	−1.47	.12
9. Enjoy going to school	1.08			.74	−1.64	−.77	.82

Note. N = 906.

Table 3
Factor Loadings and Goodness-of-Fit Statistics of the Confirmatory Bifactor Model of the MYBS

Item	General factor	Specific factors		
		Family	Peer	School
1. Comfortable around family	.63	.51		
2. Family spends time with me	.62	.58		
3. Family accepts me	.72	.46		
4. Get along with peers	.56		.64	
5. Liked by peers	.65		.38	
6. Enjoy time with peers	.57		.39	
7. Adults at school like me	.48			.60
8. Adult at school cares	.54			.41
9. Enjoy going to school	.50			.31

Note. $N = 906$. $\chi^2(18) = 31.38$, $p = .026$; root-mean-square error of approximation = .029 (90% confidence interval [.010, .045]); comparative fit index = .99; Tucker−Lewis index = .99. MYBS = Milwaukee Youth Belongingness Scale.

three model specifications, the bifactor model is clearly the most accurate representation of the MYBS data.

Study 2: Confirmatory Factor Analysis

The results just discussed were based on data from a preintervention administration of the MYBS in a pre- and post-educational intervention study. To establish the validity of the bifactor structure of the MYBS, we employed confirmatory factor analysis (CFA) on postintervention MYBS data (see the Participants section for demographic information).

To conduct the CFA, we imposed the nine-item bifactor structure discussed earlier on the postintervention data. The results of this cross-validation study are displayed in Table 5. Overall, the factor loadings and fit statistics support the bifactor structure. The general factor loadings are all moderately strong, and all specific factor loadings are greater than .30. All general factor loadings, except those for Items 3 and 5, were within .05 of the preintervention sample results, whereas most of the specific factor loadings were considerably higher in the cross-validation sample (see Table 3). Although these may be viewed as substantial differences between the samples, they do not suggest an alternate factor structure. In fact, the stronger loadings on the specific factors give more support to the claim that there is a specific factor that explains covariance among the family, peer, and school items beyond the covariance explained by the overall belongingness factor. Note also that Table 5 includes the actual wording of each item on the final nine-item MYBS scale.

All fit metrics offered similar support for the fit of the bifactor structure to the cross-validation data. The comparative fit and Tucker−Lewis indices were equivalent in both samples, whereas the chi-square value and root-mean-square error of approximation were slightly lower. In sum, these statistics unanimously supported that the nine-item bifactor structure revealed in the original sample also exists in the cross-validation sample, suggesting that this structure may hold across data gathered in future utilization of the MYBS.

To further investigate the construct validity of the MYBS, we conducted analyses of convergent and discriminant validity. The IRT-scaled scores (which represent the respondent's location along the latent trait) on the general factor of the MYBS were compared with the IRT-scaled scores from seven instruments. Convergent validity was assessed by comparing the MYBS general factor scores to scores from the Weinberger Adjustment Inventory (Self-Esteem; Weinberger & Schwartz, 1990); the School, Family, and Peer subscales of the Vaux Social Support Record (Vaux, 1988); and the Child and Youth Resilience Measure (Ungar & Liebenberg, 2011). Discriminant validity was assessed by examining the MYBS general factor scores relative to the University of Illinois Bully Scale and University of Illinois Victimization Scale (Espelage & Holt, 2001). Validation data were from the postintervention survey described earlier.

Validity study results are displayed in Table 6. All of the Pearson correlation coefficients between the general belongingness factor of the MYBS and the other scales were significant at $p < .05$. The results indicated that the general belongingness factor from the IRT model was most correlated with resilience (.70), followed by self-esteem (.53). The Family (.53), School (.52), and Peer (.43) subscales of the Vaux Social Support scale were also significantly positively correlated with MYBS general factor scores. This pattern of results supports the convergent validity of the MYBS. Negative correlations were found between general belongingness and bullying (−.23) and victimization (−.31) as measured by the University of Illinois Bully Scale and University of Illinois Victimization Scale (Espelage & Holt, 2001), thereby demonstrating the discriminant validity of the MYBS.

Table 6 also displays the correlations between the specific Family, Peer, and School subscales of the MYBS and the other scales. The MYBS specific factors aligned well with the subscales of the Vaux Social Support Record (VSSR; Vaux, 1988). Significant positive correlations were found between the IRT-scaled scores on the MYBS Family factor and the VSSR Family subscale ($r = .49$), the MYBS Peer factor and the VSSR Peer subscale ($r = .22$), and the MYBS School factor and the VSSR School subscale ($r = .54$). These results reveal the convergent validity of the specific factors of the MYBS bifactor solution. Further, all specific factors were also negatively correlated with the subscales of the University of Illinois Bully Scale and University of Illinois Victimization Scale, confirming the discriminant validity of the MYBS specific factors.

Discussion

In the current study, we proposed a measure of youth belonging that included multiple domains: school, family, and peer belonging. The purpose of this study was to examine the psychometric properties of this measure through the utilization of IRT and confirmation of the factor structure, with the hope of

Table 4
Model Comparison

Model	χ^2	*df*	*p*
Unidimensional	468.99	27	<.001
3-factor (correlated)	55.62	24	<.001
Bifactor	31.38	18	.026

Table 5
Factor Loadings and Goodness-of-Fit Statistics of the Confirmatory Bifactor Model Using Cross-Validation (Postintervention) Data

Item	General factor	Specific factors		
		Family	Peer	School
1. I feel comfortable around my family	.58	.62		
2. My family members like to spend time with me	.67	.53		
3. Someone in my family accepts me for who I am	.57	.66		
4. I get along well with people my age	.53		.62	
5. I am liked by other kids my age	.72		.32	
6. I enjoy spending time with people my age	.58		.52	
7. The adults at my school like me as much as they like other students	.51			.61
8. There is an adult at my school that cares about me	.56			.49
9. I enjoy going to my school	.50			.34

Note. $N = 857$. $\chi^2(18) = 82.415$, $p \leq .001$; root-mean-square error of approximation = .065 (90% confidence interval [.051, .079]); comparative fit index = .98; Tucker−Lewis index = .97.

demonstrating both a valid and reliable measure of youth belonging. The final scale yielded nine items (three per subscale) measuring school, family, and peer belonging. The reliabilities of the total scale and the subscales were consistent with what would be considered a viable measure (Tynes, Rose, & Williams, 2010; Vaux et al., 1986). Perhaps the most novel contribution is the bifactor solution of this scale, allowing for both a valid and reliable overall measure of general belonging as well as three independent subscales of youth belonging: school, family, and peer. In summary, the results of the study support the adoption of the MYBS as an appropriate measure of youth belonging.

As part of a secondary analysis, we examined the construct validity of the scale and confirmed its factor structure by measuring belonging alongside other constructs: self-esteem, resilience, bullying, and victimization. The relationship between belongingness and these other constructs (i.e., self-esteem, resilience, bullying, victimization) was significant and in the predicted directions. This confirms previous research that indicated belonging is related to psychosocial outcomes. More specifically, it adds value to an emerging literature base examining the impact of belonging on bullying and victimization. All of these relationships with the exception of victimization and family belongingness were significant. This would suggest that as the level of family belongingness increases, victimization decreases but not in a significant way. One possible explanation is that the vast majority of bullying behavior and the experience of victimization happens among students and their peers within the school building or online. Therefore, it may be that a strong connection to one's family does not serve as a statistically significant protective factor against being a victim of bullying.

An important observation is the testing and confirmation of the bifactor model approach for MYBS (Reise, 2012), concluding that the utilization of both subscale scores and a total scale score are useful for measuring youth belonging. This affirms Baumeister and Leary's (1995) theory that the power of belongingness increases when an individual feels connected to others in multiple life domains. Further, the theory suggests that an individual can have a satiated experience of belonging in one domain that assists with a lack of belonging in other domains (Baumeister & Leary, 1995). This has a significant impact on school-based mental health professionals' utilizing the MYBS as a screening tool to identify students who are lacking belonging and feeling isolated. The complete concept of belonging in multiple areas of their lives provides a fuller picture of individuals' subjective understanding of their connection to others. Further, this identification could potentially help with identifying students who need additional emotional and relational support to succeed in a school setting.

Table 6
Pearson Correlations Between the IRT-Scaled General Factor Scores of the MYBS and Measures of Self-Esteem, Victimization, Resilience, and Bullying

Variable	General factor	Specific factors		
		Family	Peer	School
Esteem	.53*	.17*	.17*	.20*
Resilience	.70*	.40*	.20*	.20*
Bully	−.23*	−.12*	−.07*	−.14*
Victim	−.31*	−.04	−.15*	−.08*

Note. $N = 852$. IRT = item response theory; MYBS = Milwaukee Youth Belongingness Scale.
* $p < .05$.

Limitations

Although the MYBS could be utilized as a multidimensional scale: Examining an overall sense of belonging for youth as well as three separate and independent domains of belonging, it is not without limitation. First, data were collected as part of the schools' climate survey, where school administration maintained control of survey administration, data collection, and procedural implementation. Second, validation and comparative constructs were self-report, so the MYBS could not be compared to multi-informant constructs. Third, pre- and postassessments were considered independent samples, where it is conceivable that students' sense of belonging would remain consistent from Assessment 1 to Assessment 2. Finally, the data were derived from a convenience sample from two rural middle schools, which may limit the generalizability across more di-

verse subsamples. Therefore, future studies should evaluate the MYBS across diverse subsamples of youth, while collecting data from multiple informants and establishing separate, independent subsamples through random sampling.

Implications and Conclusion

The confirmation of a valid and reliable measure of belonging for youth has the potential to be beneficial for school-based mental health professionals. The nine-item scale can help these professionals ascertain youth's level of connection to their school, peers, and family and can be a good starting point to design interventions for youth both individually and in groups to increase this level of connection to others. Further, researchers now have an opportunity to utilize a tool to measure multiple domains of belonging with just a few items to determine the relationship between belonging and other outcomes. This comprehensive measure of youth belonging can allow both researchers and clinicians to help control for additional variance in outcomes that may be attributable to different domains of belonging, compared to previous measures that examine one subtype (e.g., school) of belonging. A multidimensional measure of youth belonging can assist youth mental health professionals in assessing youth's perception of their sense of connection to others in the most salient areas of their lives. By uncovering youth's overall sense of belonging, clinicians can advocate for additional support to increase youth's belonging and in turn their well-being.

Although researchers have determined that school belongingness, most often measured by the PSSM (Goodenow, 1993), is connected with a plethora of psychosocial and academic outcomes, the MYBS will allow researchers to confirm this through the utilization of a belongingness scale that can help account for and differentiate between different domains of connection in a youth's life. The current study is an example of such utilization through the secondary analysis examining the different areas of youth belonging and their relationship with other psychosocial indicators. All of the results involved relationships in expected directions, but the statistical strength of those relationships depended upon the type of belonging (i.e., peer, family, school) at times. Further research utilizing the MYBS will allow researchers to compare the different areas of belonging and their potential additive impact on psychosocial and academic outcomes.

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