Perception of Competence in Middle School Physical Education: Instrument Development and Validation

Kristin Scrabis-Fletcher and Stephen Silverman

Perception of Competence (POC) has been studied extensively in physical activity (PA) research with similar instruments adapted for physical education (PE) research. Such instruments do not account for the unique PE learning environment. Therefore, an instrument was developed and the scores validated to measure POC in middle school PE. A multiphase design was used consisting of an intensive theoretical review, elicitation study, pre pilot study, pilot study, content validation study, and final validation study (N = 1,281). Data analysis included a multistep iterative process to identify the best model fit. A three-factor model for POC was tested and resulted in root mean square error of approximation = .09, root mean square residual = .07, goodness of fit index = .90, and adjusted goodness of fit index = .86 values in the acceptable range (Hu & Bentler, 1999). A two-factor model was also tested and resulted in a good fit (two-factor fit indexes values = .05, .03, .98, .97, respectively). The results of this study suggest that an instrument using a three- or two-factor model provides reliable and valid scores of POC measurement in middle school PE.

Keywords: motivation, social cognitive theory

Student motivation in physical education is an increasing problem for physical education teachers at all levels. Fostering student motivation by increasing interest and feelings of competence in physical education will help achieve a physical education goal as stated by the National Association for Sport and Physical Education (NASPE, 2004). To foster student motivation, teachers, parents, and administrators need a better understanding of student motivation and what influences it. It is difficult to solve a problem if one does not know its root or understand its composition. If motivating students to engage in physical education and physical activity is the goal, an appraisal must be done to determine what influences motivation. Because motivation is not tangible, but sociocognitive, instruments that are psychometrically sound and rooted in theory must be developed to identify motivation characteristics.

Motivation can be defined as the “behavioral intensity (trying hard), persistence (continuing to try hard), choice of action possibilities and performance (outcomes)” (Roberts, 1992, p. 6). Simply stated, motivation is what gets students involved in an activity, keeps them involved, and aids in completing the task at hand. In physical education, motivation can be viewed from Bandura’s (1986) social cognitive theory lens. Acknowledging an interactive effect of student thoughts and feelings (prior experience, perceived importance, and attitudes), environmental factors (context, teacher, and peers), and behavior (level of engagement) allows for better understanding of student engagement and persistence. We cannot assume that all students arrive for physical education class eager to internalize instruction and participate in learning (Solmon, 1996, 2003). Instead we must acknowledge that students cognitively mediate information received from various factors, which filter the information and influence students’ predispositions and thoughts regarding tasks, abilities, and competencies.

Various motivation theories have driven motivation research in physical education. In the past decade these have included achievement goal theory (Standage &
create learning tasks that allow students to practice and learn skills, so they can reach competence-based goals. Prior competence, however, should not be the deciding factor for students to reach these goals (Chen & Ennis, 2004; Xiang et al., 2005).

**Measurement of POC**

POC has been measured in physical activity and physical education mainly by using quantitative survey measures (Asci, Kosar, & Isler, 2001; Brustad & Weiss, 1987; Burkhalter & Wendt, 2001; Crocker & Ellsworth, 1990; Fox, 1990; Fox & Corbin, 1989; Klint & Weiss, 1987; Pappioannou, 1997; Raudsepp & Liblik, 2002; Whitehead, 1995). When comparing the measurement scales many were modified from Harter’s series that measure POC, specifically, Harter’s Perceived Competence Scale for Children (1978), the Self-Perception Profile for Children (1985), the Self-Perception Profile for Adolescents (1988), and the Self-Perception Profile for College Students (Nee- man & Harter, 1987). Within each scale are subscales for measuring specific domains, including cognitive, social, physical, and overall general self-worth. Measuring perceived athletic competence, embedded in the physical domain, is common throughout all scales, and the items reflecting this are most often used in studies of physical education and physical activity (Asci et al., 2001; Brustad & Weiss, 2001; Burkhalter & Wendt, 2001; Crocker & Ellsworth, 1990; Klint & Weiss, 1987; Pappioannou, 1997; Raudsepp & Liblik, 2002). Reliability was reported for most studies that used one scale domain and was reported with an alpha coefficient at .63 or higher. Along with the athletic competence domain, the social and cognitive subscales have been used for a more global appraisal of student POC (Brustad & Weiss, 1987; Klint & Weiss, 1987). The wording of the athletic competence scale was altered in some studies to reflect the specific activity being measured (Brustad & Weiss, 1987), without reexamining the construct or content validity of the instrument scores.

Other scales measuring competence in physical activity and physical education include the Physical Self-Perception Profile (PSPP; Fox, 1990; Fox & Corbin, 1989) and its children and youth version (CY-PSPP; Whitehead, 1995) along with modified versions of the Intrinsic Motivation Inventory (McAuley, Duncan, & Tammen, 1989) and Harter’s Perceived Competence Scale for Children (1985; Abadie, 1988; Brustad, 1996). These scales address issues related to participation and success in physical activity. However, they are not specific to physical education or the learning goals stated by NASPE (2004). The scales are general and address competence broadly.

Although competence has been examined in physical education classes, a scale has not yet been developed tailored to the specific context. Physical education and physical activity are used interchangeably in the literature.
as the context for measurement, but from a pedagogical viewpoint the two are quite different. One may argue that physical education includes physical activity, but the content is not limited to physical activity. The NASPE (2004) standards are clear that skill learning, personal and social responsibility, understanding of movement, and personal appreciation and valuing of physical activity are integral components of physical education, not simply being physically active. Shen et al. (2008) asserted the need for domain specificity in research on motivational constructs in physical education. Therefore, given the theoretical differences between physical education and physical activity, creating a specific scale for measuring POC in physical education will offer a clearer understanding and accurate appraisal of students specifically in that setting.

The purpose of this study was to design a scale to measure POC, specifically in middle school physical education. Middle school is a time when so many changes occur in students’ lives and decisions can be made that have influence on future behaviors and habit creation (Wigfield & Wagner, 2005). By gaining insight into the sociocognitive processing at this age and identifying critical factors that influence motivation, potential methods for fostering motivation may be implemented. Physical education is a unique context, and instruments are needed to account for the nuances of the environment and its learning and achievement goals.

Method

Development and validation of the scores to measure middle school physical education students’ POC required a multiphase design involving (a) an elicitation study and item generation, (b) a prepilot review, (c) a pilot study, (d) a content validation study, and (d) assessment of reliability and construct validity. Prior to the study, we conducted an extensive review of the literature to identify factors reported to have an impact on student POC and used this as the basis to ensure all reported factors were addressed. These were clustered and categorized into main factors of either a personal or social information source (Skauvik, 1997). Personal sources are located internally and are not influenced by outside individuals; primary factors included: prior experience (Mallam, Metcalf, Kirkby, Voss, & Wilkin, 2003), importance (Paxton, Estabrooks, & Dzwaltowski, 2004), age (Harter, 1982, Xiang, McBride, & Bruene, 2004), skill level (Portman, 2003; Solmon & Lee, 1996), gender (Crocker & Ellsworth, 1990; Solmon, Lee, Belcher, Harrison, & Wells, 2003), and socioeconomic status (Harrison, Lee, & Belcher, 1999). Social sources of information depend on what others do or say, and often the student has no control over their influence. Primary factors clustered under social sources included: teacher (Lee & Solmon, 1992), peers (Burkhalter & Wendi, 2001), family (Felton et al., 2002), societal expectations (Solmon, 2003), and context (Cury, DaFonesca, & Rufo, 2002). Within the personal and social primary factors were more specific subfactors. For example, under prior experience were the subfactors of negative or positive experience and the amount of experience/practice. Examples of subfactors nested under the teacher factor included teaching style, teacher communication and feedback, and class learning goals. All factors were interactive, and all needed to be addressed and represented in the instrument items.

Instrument Development: Elicitation Study and Item Generation

Once we identified the factors, we developed an open-ended questionnaire regarding information sources for POC. The questionnaire was distributed to 63 middle school students in two middle schools—one urban and one suburban. Its purpose was to ascertain the language middle school students used in order to create instrument questions appropriate to their reading and comprehension levels. An example of a questionnaire item would be, “what would someone do to make you think you are good at an activity/sport?” Once the questionnaires were reviewed, key words, language, and phrases were chosen that appeared in many of the responses, and this language was incorporated in the first draft of the instrument to increase readability.

All primary factors and subfactors were addressed in a minimum of two and maximum of six questions. The scale used a 5-point Likert-type technique, with responses ranging from 5 = strongly agree to 1 = strongly disagree. Once the items were generated, a panel of physical education experts conducted a prepilot review. The panel comprised 11 current physical education teachers and supervisors who were completing doctoral work in physical education. They reviewed the instrument items for clarity and to determine if they addressed the intended factors. Then they discussed each instrument item and made revisions based on feedback.

Specific revisions included rephrasing the questions to ensure they asked students about their POC and not actual skill performance. For example, a question originally written as “haveing played the game or activity before makes me better at it” was changed to “I think I am better at the game or activity because I have played it before.” To create consistency across the questions, the format of each was restructured to measure thoughts and perceptions, not performance.

Instrument Development: Pilot Study

The pilot study involved distributing the revised instrument and demographic sheet to middle school
physical education students (N = 355) in grades seven and eight to test the validity and reliability of scores. All students provided informed consent to participate. The pilot study instrument contained 69 items and had at least one question addressing each factor identified in the theoretical factor rationale chart. Questions were in both positive and negative form, and there were separate instruments for each gender to account for the gender-specific questions.

Both exploratory and confirmatory factor analyses were used to measure the construct validity to ensure the instrument scores measured what they were intended to measure (Shulruf, Hattie, & Dixon, 2007; Silverman & Subramanian, 1999; Thomas, Nelson, & Silverman, 2005). Exploratory and confirmatory factor analyses have been used widely in validating instrument scores and allow models to be refined and constructs more clearly defined (Gill, 1997; Green, Thompson, & Poirier, 1999). The validation procedure was an iterative process and included examination of factor loadings and the scree plot, reliability checks within the factors and for overall scale, and revisions to ensure a good model fit.

From the exploratory factor analysis and scree plot examination, four main factors were identified. A cutoff criterion of .30 was used for item loadings (Stevens, 2001). One factor only had one question loading; therefore, it was eliminated. The remaining three factors were then examined and reduced to eliminate any items with double loadings. Once that was completed, the instrument was reduced to 31 items. Each item was then examined to see if it was redundant or if both the positive and negative forms of the question were included.

Confirmatory factor analysis (CFA) was conducted using PROC CALIS in Statistical Analysis Software 9.1 (SAS Institute, Inc., 2004). The respective fit statistics and overall model fit were checked at each stage of revision. The specific fit indexes used to determine the construct validity in this study included goodness of fit (GFI), adjusted goodness of fit (AGFI), root mean square residual (RMSR), and root mean square error of approximation (RMSEA). The general cutoff criteria for each index varied. The GFI and AGFI criteria were set as close to 1 as possible, and RMSR and RMSEA were set at .08 or lower. These analyses were conducted multiple times, including a differing number of questions ranging from 27 items to 14 items. After this series of analyses, the best fit of the model included an instrument with 21 items fitting a three-factor model. The fit statistics reported for the 21-item instrument were .87 for GFI, .84 for AGFI, .08 for RMSR, .07 for RMSEA. All scores fell in the acceptable range for model fit (Browne & Cudeck, 1993; Cronbach, 1951; Goodwin, 1999; Keating, Silverman, & Kutluna, 2001; Subramanian & Silverman, 2000).

The resulting three-factor model included both the personal and social overall factors discussed previously, but the factors were more specific: (a) personal, including prior experience, self-appraisal of skill, and amount of practice; (b) peers/family social, including feedback and interaction with peers and family; and (c) teacher behavior/teacher social, including information received from the teacher and the teacher's style, behavior, and lesson. The reliability of each factor was reported as .66, .63, and .61, respectively, and .64 for the overall scale. Although this reliability is moderate to low, it is still considered acceptable (Cronbach, 1951).

**Instrument Development: Content Validation Study**

A content validation study ensured the items assessed one of the three factors they were intended to. Forty-eight specialists in physical education pedagogy (those with doctorates in the field) received specific directions via email asking them to read each question and assign it to one of the three-factor categories: personal, peers/family social, or teacher behavior/teacher social. For content validation, nine extra items were added back into the instrument due to their moderate loadings in the exploratory factor analysis. This allowed for any variability in data collection. Agreement across the 34 respondents was .98, demonstrating that the items asked questions about the intended factors. One of the nine questions was removed, because expert agreement after content validation was low (< .90) for the intended factor.

**Data Collection: Validation Study**

**Participants.** This study involved physical education students from seven urban and suburban public schools on the U.S. east coast. Schools were chosen based on program strength and curricular offerings. Because the instrument items were not specific to certain sports or activities, the instruction unit at the time of data collection was not a factor that would influence student response. A total of 1,281 students (n = 627 boys, n = 654 girls) in grades 6–8 (n = 313 in sixth grade; n = 581 in seventh grade; n = 387 in eighth grade) participated in the final validation and reliability study. Their ages ranged from 11 to 15 years old (M years = 12.5, SD = .95). The institutional review board, necessary administrators, and board of education at the individual schools provided approval, and all participants provided informed consent and assent.

**Procedures.** In all but two sites, the physical education teacher distributed the survey instrument to the students. The primary researcher met with teachers individually to review the instrument, discuss implementation, and answer any questions. Teachers were instructed to ensure the students were spaced apart to avoid discussion during data collection. Participants were instructed to think of their experience in physical education only and not on sports teams or recreational clubs. They were reminded...
that their answers would not reflect on their physical education grade in any way. The same demographic sheet used in the pilot study was attached to the instrument to obtain information regarding gender, grade, age, and the activity they currently participated in during class.

Data Analysis. To determine the final scores of construct validity and reliability for the Middle School Physical Education POC Scale, similar iterative steps were followed as in the pilot study. Once all the data were collected, a scree plot and exploratory factor analysis using varimax rotation was conducted in SPSS to determine the number of factors represented and the questions loaded on each factor. Exploratory factor analysis has been documented as an effective way to improve model fit (Green et al., 1999) and was a useful first step in this study. Using a cutoff criterion of .50 (Stevens, 2001), items were examined to see if any double loaded. If an item did not reach the criterion or double loaded, it was removed. The next step was to determine Cronbach’s alpha coefficients to determine the internal consistency of the scores for each factor. Once reliability was determined, a correlation matrix along with means and standard deviations for all 30 items, was created in SAS. The correlation matrix, means, and standard deviations were used in the confirmatory factor analysis using maximum likelihood estimation. To find the most parsimonious fit, reliability checks and model testing were conducted numerous times. The purpose of the iterative steps was to ensure the best model fit and theoretical basis for the model design. The final step was a descriptive analysis of mean scores for the factors for each grade level and gender.

Results

In determining the results for the final validation study there were multiple iterations involved in the CFA procedure. For each iteration, the model was examined in an effort to find the best fit. The original three- and two-factor model were represented in the data. As initially discussed, many factors have been identified in the literature as influencing POC. All of these factors were represented in the pilot study instrument but after the initial data analysis some factors were removed and some were grouped under a single heading. This helped to narrow the factors to specific targeted areas in the questions. It also helped to specify the major determinants for influencing POC in middle school students.

Three-Factor Model

The initial three-factor model hypothesized included personal experience, social sources of information, including peers and family, and the teacher each factor being addressed by seven questions, 21 items in total. Initial reliability analysis resulted in low coefficients, .63, .60, and .61 respectively and CFA results displayed a poor model fit (GFI=.84, AGFI = .80, RMSR = .10, RMSEA = .09). Therefore, iterative steps were taken to find the best collection of items that provided a model consistent with the theoretical framework.

After multiple iterations, acceptable fit of the model was determined with 15 items representing the three factors. All of the eigenvalues for each of the factors were above 1.0, which is widely accepted as an acceptable criterion (Stevens, 2001) and a cutoff score of .30 was used for the criteria of factor loadings (see Table 1). The factors remained the same; however, a more specific indication was given of the specific component of both the personal and social factors. The personal factor was specified to prior experience and the social factor was limited to peers. Eight items addressed Factor 1, which changed from personal experience to more specifically prior experience, alpha coefficient .66, three items addressed Factor 2, social, which was now limited to peer only, alpha coefficient .80, and four items addressing Factor 3, teacher behavior, alpha coefficient .85. Alpha coefficients for the peer and teacher factor are in the acceptable range of greater than .60 (Cronbach, 1951; Kline, 1998).

The final fit statistics for the three-factor model including 15 items were in the acceptable range as determined by Hu and Bentler (1999), GFI = .90, AGFI = .86, RMSR = .07, RMSEA = .09. From the three-factor analysis it was decided to test the possibility of a two-factor model that eliminated the prior experience factor. Theoretically, this seemed reasonable as there is great variability within one class and the amount of prior experience any student can have in a specific context may vary. The peer and teacher factor could be, however, more stable due to the nature of the school environment and certification requirements and training of teachers. Therefore, an analysis was conducted using the peer and teacher factors creating a two-factor model.

Two-Factor Model

From the results of the three-factor model and the strength of the alpha coefficients for the peer and teacher factors, testing a two-factor model was advantageous. Therefore, the prior experience factor was removed reducing the instrument to seven items representing only the peer and teacher factor. The same steps were taken adding and removing items to find the most representative fit. The final two-factor fit statistics demonstrated an excellent fit with GFI = .98, AGFI = .97, RMSR = .03, and RMSEA = .05 being reported. These fit statistics show a strong model fit with the two-factor model.

Table 2 includes the overall specifics regarding the instrument evolution and varying fit statistics from the
multiple phases of the study including the pilot study, the three-factor model, and finally the two-factor model. The table includes fit statistics and the alpha coefficients for each model. The alpha coefficients for the factors are in the acceptable range and improved from the pilot study to the validation study.

In summary, the fit statistics for both the two- and three-factor models are acceptable. However, the two-factor model demonstrates an excellent model fit making it a somewhat stronger model of middle school students' POC in physical education. Table 3 includes the results from the descriptive analysis of scores for the factors by gender.

**Table 1. Instrument items and corresponding factor loadings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1: Personal experience</th>
<th>Factor 2: Peer</th>
<th>Factor 3: Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If I failed or lost in an activity before I don't think I will ever be good at it.</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. If I have tried the activity before and not played it well then I don't think I will be good at it in physical education class.</td>
<td>.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. I don't think I am good at physical education activities I don't like.</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. I don't think I am good at activities I don't have the skills to play.</td>
<td>.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I think I am good at activities that I get to play outside of school.</td>
<td>.56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. If I have not played the activity well before, I don't believe I will play it well in physical education class.</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. I don't think you can be good at some activities if you have not played it before.</td>
<td>.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. I don't think I am good at an activity if I don't score any points when playing it.</td>
<td>.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I know I am good at activities in physical education because my friends tell me I am good.</td>
<td>.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. If my friends tell me I am good at something then, I think I am good at the activity.</td>
<td>.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. When my teacher lets me make decisions about the activity I think I will do better in the activity.</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2. Model fit statistics and Cronbach's reliability coefficients**

<table>
<thead>
<tr>
<th>Model/ # of items</th>
<th>GFI</th>
<th>AGFI</th>
<th>RMSR</th>
<th>RMSEA</th>
<th>Personal experience</th>
<th>Peers α</th>
<th>Teacher α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three-factor model</td>
<td>.87</td>
<td>.84</td>
<td>.08</td>
<td>.07</td>
<td>.66</td>
<td>.63</td>
<td>.61</td>
</tr>
<tr>
<td>Validation study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three-factor model</td>
<td>.90</td>
<td>.86</td>
<td>.07</td>
<td>.09</td>
<td>.66</td>
<td>.80</td>
<td>.85</td>
</tr>
<tr>
<td>Validation study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-factor model</td>
<td>.98</td>
<td>.97</td>
<td>.03</td>
<td>.05</td>
<td>n/a</td>
<td>.80</td>
<td>.85</td>
</tr>
</tbody>
</table>

Note. GFI = goodness of fit index; AGFI = adjusted goodness of fit index; RMSR = root mean square residual; RMSEA = root mean square error of approximation.
tive reasoning of middle school students. Using a strong theoretical knowledge base as the guiding framework, as was done in this study, assists in creating an instrument that captures what is known about the construct and aids in broadening the scope of what new information may be embedded within the construct (Ennis, 1999). Prior to beginning this study an extensive review of previous research findings was conducted and allowed for POC to be examined holistically and at the factor level.

From the multiple iterations in factor analysis two models were identified whose scores demonstrated acceptable reliability and validity. It is interesting to examine the models and their differing factors when compared to prior research. Research regarding competence has highlighted the importance of prior experience in determining POC (Mallam et al., 2003; Nicaise et al., 2006; Solmon et al., 2003). When examining prior experience as a factor in the current POC model, however, it did not appear psychologically to have as much impact as originally thought. Therefore, future research may assess how much prior experience influences and in what context, recreational with friends or structured such as on a team or club, is necessary to impact POC.

The amount of prior experience may differ across students. Schools are designed with the idea of equal education for all; therefore, prior experience may not be as important in the physical education setting because of the imbedded equality to access of resources and instruction by the teacher. Curriculum alignment assists in providing an outline for teachers across schools and within districts to provide similar experiences to all students. Implementation of a standards based curriculum also assists in setting criteria for students to reach and helps reduce redundancy and neglect of certain activities (Lund & Tannehill, 2005).

This study’s multiphase design with multiple iterative steps allowed for an evolution of the instrument from the pilot phase to the validation study. Although the initial model created after the pilot test did not establish the same fit statistics, it did offer more insight into the creation of POC and its influences. By diagnosing what impacts POC more research can be conducted examining each of the factors to allow for a better understanding.

During data collection the students were reminded to think of their experience in physical education only and not their experience on sports teams. Perhaps the lower psychometric strength for prior experience in the three-factor model can be explained based on the context of a physical education setting. Redundancy in material along with overexposure to activities compounded by mixed messages and resulting experiences, can decrease the value of the activity and the prior experience (Ennis, 1995). Therefore, because conflicting messages and success rates are experienced, students may begin to lessen the importance of prior experience and rely more on peers and the teacher to influence their POC. This reinforces the need for an instrument specific to physical education and how POC may differ in physical activity and physical education.

The peer factor and teacher factors were consistent in both the three- and two-factor models. High reliability was reported along with fit indexes indicating an excellent fit. This is due to the multiple iterations in analysis and testing of different models that provided acceptable fit statistics and were anchored within the theoretical framework. Along with multiple steps, the large sample size in this study reduces the threats to validity and reliability.

Middle school and adolescence is a transitional time and information received from outside sources can be a prominent source of information. Changes in relationships and, the shift to more strength in social comparison, places peers and teachers on the precipice of influencing POC. Wigfield and Wagner (2005) stated that social comparison may cause doubt in abilities, therefore, changing beliefs about competence and in turn motivation. Peers have been found to be instrumental sources of information in this social comparison (Burkhalter & Wendt, 2001; Cothran & Kulina, 2006; Garn et al., 2007; Lee & Solmon, 1992; Solmon, 1996; Wentzel, 2005). It is not surprising that high reliability was reported for the peer factor given their reported influence in adolescent appraisal of competence.

The teacher has been cited repeatedly as a source of competence information. How the teacher designs the class has received a great deal of attention when examining various motivational constructs in physical education (Chen & Ennis, 2004; Garn et al., 2007, 2008; Solmon, 1996; Xiang, McBride, & Bruene, 2004; Xiang et al., 2005; Xiang et al., 2006). Specific behaviors that have been found to influence competence include allowing for autonomy in class (Goudas et al., 1994; Shen et al., 2007) and how he or she interacts with the students in regard to feedback and instruction (Kim & Ennis, 2007; Nicaise et al., 2006; Lee & Solmon, 1992; Urdan & Turner, 2005). This study confirms these characteristics as highlighted by the content of the questions included in the teacher factor. Therefore, the two-factor model may be more appropriate for middle school physical education.

<table>
<thead>
<tr>
<th>Table 3. POC factor scores by gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Women (n = 654)</strong></td>
</tr>
<tr>
<td><strong>Men (n = 627)</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>M</strong></td>
</tr>
<tr>
<td>Prior experience</td>
</tr>
<tr>
<td>Teacher</td>
</tr>
<tr>
<td>Social</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>M</strong></td>
</tr>
<tr>
<td>Prior experience</td>
</tr>
<tr>
<td>Teacher</td>
</tr>
<tr>
<td>Social</td>
</tr>
<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>Note:</strong> M = mean; SD = standard deviation.</td>
</tr>
</tbody>
</table>
education students because it is based on social factors, which as stated above, are generally more important to adolescent students. In conclusion, an instrument to assess a sociocognitive process has been developed with scores that suggest it is reliable and valid for middle school physical education students. Having an instrument with strong psychometric properties designed specifically for physical education allows for a more accurate assessment of POC. Previous research has relied on modifications of or parts of instruments designed for general physical activity and not physical education. Due to the unique contextual variables of physical education, an instrument that considers the most relevant factors will provide a more accurate representation of POC.

Future research regarding POC at other school levels in physical education may find this instrument generalizable because of the large sample size that participated in this study, from both suburban and urban environments. Thus, others using this instrument with similar middle school populations will find it appropriate and applicable. Those administering the instrument to other samples with different characteristics may require additional tests of reliability and validity. One’s perceptions are dependent on so many different factors and can vary across experiences that it is difficult to say definitively what will apply to all students. Therefore, revalidation of the scores with other middle school physical education students and perhaps other age groups would add to the existing body of knowledge regarding physical education POC. In analyzing future results and either the two- or three-factor model, it is important to consider the amount of prior experience and if it can be measured accurately. When using a diverse sample with great variation in prior experience, applying the two-factor model is recommended.

As Solomon (2003) eloquently stated, learning is an interactive process and students arrive with differing entry characteristics influencing their learning and motivation to learn. By assessing their perceptions of competence through various measures, both quantitative and qualitative, and longitudinally, a better understanding would be gained. This will allow for curriculum and instruction to be better informed. The two- and three-factor models of POC offer interesting insight into the role that prior experience plays in determining competence. It is apparent that the two-factor model has excellent fit statistics and is preferred for middle school physical education. However, future research testing the three-factor model and specifically diagnosing the prior experience factor would offer more insight and understanding of POC in middle school physical education. The nature of the experience along with the amount of it needs to be examined in future research to see how strong a factor it is in determining competence. The development of this instrument provides a strong basis for this future research.

References


black and white girls living in rural and urban areas. *Journal of School Health*, **72**, 250–255.


**Authors’ Note**

Please address all correspondence concerning this article to Kristin Scrabis-Fletcher; 26 N. College Avenue; Newark, DE 19716.

E-mail: ksfs@udel.edu