Considerations of Throwing Athletes With Upper Extremity Injury When Completing the Single Assessment Numeric Evaluation (SANE): A Report From the Athletic Training Practice-Based Research Network

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Context: The Single Assessment Numeric Evaluation (SANE) is a widely used patient-reported outcome (PRO) measure that provides an efficient but limited view of patient perceptions of health. Knowledge of what throwing athletes with upper extremity injury consider when answering the SANE would inform score interpretation and increase its value for clinical decision-making in this patient population.

Objective: To investigate the global rating of the SANE and its ability to capture constructs of health reflected in PRO measures that are commonly used in throwing athletes with upper extremity sport-related injury.

Design: Cross-sectional study.

Setting: Retrospective database review.

Patients or Other Participants: De-identified patient records of baseball and softball athletes diagnosed with upper extremity sport-related injury between October 2009 and June 2021 were reviewed.

Main Outcome Measure(s): Primary outcomes were scores on the SANE; Functional Arm Scale for Throwers total; Disabilities of the Arm, Shoulder, and Hand total; and Global Rating of Daily Activities. The first administration of all PROs that patients completed postinjury was analyzed as a potential predictor of SANE scores. The proportion of variance uniquely accounted for in the SANE by each predictor (R^2) variable was estimated.

Results: Fifty-five patients completed PRO measures. The Functional Arm Scale for Throwers total uniquely accounted for 32.9% (P < .001), the Global Rating of Daily Activities uniquely accounted for 11.6% (P < .001), and the Disabilities of the Arm, Shoulder, and Hand total uniquely accounted for 4.6% (P = .036) of the variance in the SANE score. Overall, the predictors accounted for 49.2% of the variance in the SANE score (P < .001).

Conclusions: Given that the SANE captures multiple constructs of health, it may be useful in gathering a quick, broad view of throwing athletes' perception of their health. When SANE scores suggest diminished health, then multi-item PROs should be considered to further explore constructs of health most affected.

Key Words: baseball, patient perception, single-item patient-reported outcome measures, softball, whole-person health care

Key Points

- Commonly cited barriers to administering patient-reported outcome measures include time and their scoring and interpretation, so using global single-item measures, such as the Single Assessment Numeric Evaluation, that are quick and easy to interpret might facilitate adding patient perspective to the care process.
- Baseball and softball athletes with upper extremity sport-related injuries consider multiple constructs of health, such as daily and sport activities, when answering the Single Assessment Numeric Evaluation, which are also constructs captured in the Functional Arm Scale for Throwers (33%), Global Rating of Daily Activities (11.6%), and Disabilities of the Arm, Shoulder, and Hand (4.6%).
- When time and interpretation constraints are barriers to patient-reported outcome measure use, Single Assessment Numeric Evaluation ratings may provide a helpful assessment because they represent multiple constructs of health and provide a wider health perspective of how the injury is affecting the patient.

wareness of patient perceptions of their health is important to provide whole-person, patient-centered care and to ensure that care is tailored and addresses the patient's primary health care needs. Comprehensive assessment of patient outcomes often emphasizes patientreported assessment tools. Patient-reported outcome (PRO) measures are tools that capture the patient perspective, which can then be incorporated into the care process. One challenge with the use of PROs is the selection, integration, and interpretation of results, particularly given the number of PROs

available and the time barriers associated with collecting outcomes.^{1,2} For example, over 28 PRO measures exist that evaluate the health of people with shoulder and elbow injuries.¹ Further, the type of PRO measure used (generic versus specific, single-item versus multi-item) determines the information obtained and how it can be applied to clinical decision-making.^{3,4} Because time is a concern for health care providers when using PROs, measures that are efficient yet provide meaningful insight into patient perspectives are desired.^{2,5,6}

One way to limit patient and clinician burden is to consider the type of PRO measure selected.^{3,6} Patient-reported outcome measures are designed as self-report multi-item or single-item questionnaires and are categorized as generic or specific in scope.⁴ Benefits and limitations to the type of PRO used exist, and selection is a compromise between the depth of patient perspective obtained and the time burden of administration, scoring, and interpretation.^{2,5,7} A multiitem PRO measure may provide a more robust assessment of health, but it also has a greater administrative and interpretation burden. The lesser time burden of administering a single-item PRO measure may outweigh the information gained with a multi-item measure.⁷ Research is necessary for better interpretation of single-item PROs to optimize their value in clinical decision-making.

Baseball and softball athletes experience upper extremity injuries caused by the repetitive and high loads associated with throwing. In high school baseball and softball players, shoulder and elbow injuries occur at a rate of 1.39 and 0.86 per 10 000 athlete-exposures, respectively.8 Even without a documented injury, throwing athletes frequently report playing with upper extremity pain, which has been associated with a negative effect on health-related quality of life (HRQOL).⁹ Therefore, a comprehensive patient evaluation that includes PRO measures to gather the patient perspective is important in the care of baseball and softball athletes. The Disabilities of the Arm, Shoulder, and Hand (DASH) is a widely researched region-specific multi-item PRO that evaluates disability and symptoms.^{10,11} The Functional Arm Scale for Throwers (FAST) is a region- and population-specific multi-item PRO that incorporates guestions related to 5 domains of health.^{12,13} Because they are multi-item PROs, the DASH and FAST require time for completion and scoring and, as a result, may be underutilized. Researchers have suggested that, when athletic trainers use PROs, 69.7% commonly use single-item measures.⁵ However, efforts to support better interpretation of singleitem PROs are needed.

The Single Assessment Numeric Evaluation (SANE) is a single-item, generic PRO that evaluates the current perception patients have of their body, body region, or injury from a global perspective.^{14–17} For clinicians who value the collection of PROs yet lack resources or time for more robust measures, the SANE may be an efficient option.¹⁵ However, studies in which authors have investigated the interpretation of the SANE in throwing athletes with upper extremity sport-related injury are limited. Further, the broad scope of global single-item PRO measures, including the SANE, limits insight into the details of what patients are considering when answering the question. To increase the value and interpretability of the SANE as an outcome tool, more insight into what aspects of health patients are thinking about when responding to the question.

is needed. Therefore, the purpose of the current study was to investigate the global rating of the SANE and its ability to capture constructs of health reflected in PRO measures that are commonly used in throwing athletes with upper extremity sport-related injury.

METHODS

Study Design

In the current study, we used a retrospective cross-sectional study that analyzed de-identified patient data using Web-based electronic medical records (EMRs) from the Athletic-Training Practice-Based Research Network (AT-PBRN). Integrated within the AT-PBRN, the Clinical Outcomes Research Education for Athletic Trainers (CORE-AT) EMR is a fully functional electronic clinical documentation system created by and used by athletic trainers that consolidates injury-surveillance and patient-oriented clinical outcomes components.¹⁸ Injuries were diagnosed by a Board of Certification–credentialed athletic trainer after a clinical evaluation of the patient. The EMR is compliant with the data acquisition, storage, and transmission standards set forth by HIPAA.¹⁸ The local institutional review board approved the current study.

Patient Data

Patient data from the CORE-AT EMR were extracted from the records of baseball and softball players with a diagnosed upper extremity injury. Possible injuries included those to the shoulder, arm, elbow, forearm, wrist, and hand or fingers. Injured athletes included secondary school and collegiate athletes, aged 14 to 24 years. Data were only included if patients completed all the following PRO measures: SANE, FAST, DASH, and Global Rating of Daily Activities (GRODA) at least once during their care. The first PRO administration captured in the CORE-AT EMR after injury was used for the analyses. Patient data were excluded if the record was for a non-sport-related injury, an injury to their nonthrowing limb, or if PRO measures were not completed on the same day.

Instrumentation

Single Assessment Numeric Evaluation. The SANE is a single-item PRO measure that evaluates the patient's current rating of the health of an injured body part and recently was recommended as the primary PRO measure for patients with all shoulder conditions.^{7,14} In the CORE-AT EMR, the SANE asks, "On a scale of 0 to 100, my injured body part is _____ out of 100," where 0 is no use of my injured body part, and 100 is full use of my injured body part. The SANE score is valid (0.50-0.88), reliable (>0.80), and responsive.¹⁹ It has also been validated in comparison with the American Shoulder and Elbow Surgeons score in different patient (rotator cuff repair: intra-class correlation coefficient $[ICC]_{2,1} = 0.85$; shoulder replacement: $ICC_{2,1} = 0.72$) and treatment (therapy: $ICC_{2,1} = 0.82$) groups.²⁰ The SANE was found reliable ($ICC_{2,1} = 0.84$, standard error of the measure = 3.4) with a minimal detectable change of 7% to 9% and minimal clinically important difference of 11.8% to 18% across patients with various shoulder conditions managed surgically (total shoulder

arthroplasty, rotator cuff repair) and nonsurgically (sub-acromial impingement, adhesive capsulitis).²¹

Functional Arm Scale for Throwers. The FAST is a region-specific and population-specific PRO measure developed to evaluate the HRQOL of throwers with upper extremity sport-related injuries.^{12,13} The FAST includes both sport-related and non–sport-related items across 5 domains (pain, throwing, activities of daily living [ADL], psychological effect, and advancement) to create a comprehensive examination of the effect of the upper extremity condition on the life of the patient.^{12,13} With its 22 items, the FAST produces a total score between 0 and 100 points, and a higher score indicates a lower HRQOL.^{12,13}

Disabilities of the Arm, Shoulder, and Hand. The DASH is a region-specific PRO that evaluates the effect of upper extremity conditions on physical disability and symptoms.¹¹ The DASH includes 30 items, and a total score is calculated out of a possible 100 points; a higher score indicates lower HRQOL. The DASH has been found to be valid, reliable, and responsive to change across a variety of populations and upper extremity conditions.^{10,11,22} Concurrent validity between the FAST total and DASH total is good (Pearson ICC = 0.72).¹²

Global Rating of Daily Activities. The GRODA is another single-item PRO measure that captures the patients' perspectives about their ability to complete daily activities during a defined time, such as chores and eating over the past week. In the CORE-AT EMR, the GRODA asks, "How much has your injury affected your normal daily activities (eg, chores, walking, eating) in the past week?" Responses are collected using a 7-point Likert-like scale ranging from 0 (*no difficulty completing my daily activities*) to 6 (*unable to complete my daily activities*).²⁰ The GRODA provides insight into the patient's perception of how an injury affects life outside of sport by focusing on ADL.

Procedures

De-identified patient records from athletic trainers who diagnosed baseball or softball athletes with an upper extremity sport-related injury were extracted from the CORE-AT EMR between October 2009 and June 2021. For the current study, data for the following variables were extracted to describe the patients included in the analysis: patient demographics (age, sex, height, mass, sport, and position), specific injury characteristics at initial evaluation (time of injury, body part and diagnosis, and severity), and PRO scores from the first recorded administration (SANE, FAST total, DASH total, or GRODA). Injury characteristics of diagnosis and severity were determined by the athletic trainer based on the clinical evaluation. The CORE-AT EMR organizes all single-item PROs together in the daily treatment note. The order of presentation is SANE, then GRODA. The multi-item measures are provided to patients based on the body part injured, with shoulder injuries receiving the DASH. Throwing athletes with shoulder injuries also receive the FAST. While order is designed to be single items followed by multiple items, it is possible that this was not the case for every patient.

Statistical Analysis

Summary statistics were calculated as means (standard deviations) and frequencies (percentages). Pearson correlation

Table 1. Demographic and Injury Characteristics Documented at Initial Evaluation of Baseball and Softball Players With a Diagnosed Upper Extremity Injury (N = 55)

Characteristic	No. (%)
Sex	
Male	39 (70.9)
Female	16 (29.1)
Sport	
Baseball	39 (70.9)
Softball	16 (29.1)
Position	
Infield	13 (23.6)
Outfield	6 (10.9)
Pitcher	31 (56.4)
Catcher	5 (9.1)
Body part and diagnosis	
Shoulder or arm	37 (67.3)
Tendinopathy (biceps, rotator cuff)	23 (41.9)
Shoulder pain, generalized	7 (12.7)
Labral tear	4 (7.3)
Brachial plexus neuropraxia	2 (3.6)
Dislocation or subluxation	1 (1.8)
Elbow or forearm	18 (32.7)
Elbow sprain or strain	12 (21.8)
Medial epicondylitis	4 (7.3)
Wrist sprain or strain	1 (1.8)
Elbow or forearm fracture	1 (1.8)

coefficients were used to estimate the linear aspect of the relationship between 2 variables so that related variables could be identified. Candidate predictors, based on a P = .15 cutoff, were included in a simultaneous linear regression to quantify the relationship between the SANE and potential predictor variables, including the FAST total, DASH total, and GRODA. Sex and age were considered potential covariates. The Kolmogorov-Smirnov test was used to examine distribution, and the Breusch-Pagan test was used to examine the heteroscedasticity of the SANE scores. The proportion of variance in the SANE uniquely accounted for by each predictor (R^2) variable was estimated. Unstandardized regression coefficients (B) are provided. The α was set a priori at .05. Analyses were conducted using SPSS (Version 28.0; IBM Corp).

RESULTS

Data from 55 injured baseball and softball athletes were included in the current study. Patients were aged 17.6 \pm 2.1 (range, 14–24) years, were 154.6 \pm 59.8 cm tall, and weighed 68.1 \pm 27.7 kg (Table 1). Table 1 also summarizes injury characteristics documented by athletic trainers in the CORE-AT EMR at the initial evaluation. Most injuries occurred during the off-season (56.3%), were due to insidious onset (54.5%), and were mild (56.4%) or moderate (34.5%) in severity. The mean duration between injury and the first PRO administration captured in the CORE-AT EMR was 9.1 \pm 9.6 days (range, 0–51 days).

Preliminary analysis indicated that the FAST total (r = -0.57, P < .001), the DASH total (r = -0.36, P = .007), and the GRODA (r = -0.50, P < .001) were bivariately correlated with the SANE (Table 2). Sex ($r_{\rm pb} = -0.02$, P = .86) and age (r = 0.18, P = .32) were not associated with the SANE, so they were excluded from any further analyses. Table 2 presents the bivariate correlations of variables.

Table 2. Bivariate Correlations for the SANE, FAST, DASH, and GRODA Scores of Baseball and Softball Athletes With Upper Extremity Injuries (N = 55)

Candidate Predictor	SANE
Age	0.18
Sex	0.02ª
FAST	-0.57 ^b
DASH	-0.36 ^b
GRODA	-0.50 ^b

Abbreviations: DASH, Disabilities of the Arm, Shoulder, and Hand; FAST, Functional Arm Scale for Throwers; GRODA, Global Rating of Daily Activities; PRO, patient-reported outcome; SANE, Single Assessment Numeric Evaluation.

^a Point-biserial correlation.

^b P < .01.

In the model tested, the FAST total, DASH total, and GRODA were entered simultaneously into the linear regression analysis to predict the SANE.

The SANE, FAST total, DASH total, and GRODA from 55 patients are summarized in Table 3. The SANE scores were normally distributed (Kolmogorov-Smirnov = 0.0913, P = .71; Breusch-Pagan = 5.41, P = .144), and the residuals from the simultaneous regression analysis were symmetrically distributed about 0, with no discernable pattern. The mean SANE score was 74.4 \pm 15.1, and the median was 75 out of a maximum score of 100. One patient (1.8%) scored the maximum value of 100, and 5 patients (9.1%) scored more than 90, which does not indicate a ceiling effect.^{23,24} The FAST total score (B = -0.491, P < .001) uniquely accounted for 32.9% of the variance in the SANE rating. The GRODA (B = -7.941, P < .001) uniquely accounted for 11.6% of the variance in the SANE. The DASH total score (B = 0.499, P = .036) uniquely accounted for an additional 4.6% of the variance. In total, the 3 predictors accounted for 49.2% of the variance in the SANE rating (P < .001).

A reviewer of the original version of this manuscript justifiably expressed a concern about the truncated distribution of the GRODA, and the fact that it uses an ordinal rather than scale level response set. We reconfigured the regression analysis reported above using a categorical expression for the GRODA. The results did not change substantively (*P* value for GRODA < .001), and the total variance in the SANE accounted for was 50.7%.

DISCUSSION

In the current study, we investigated the SANE and its ability to capture constructs of health reflected in PRO measures that are commonly used in throwing athletes with upper extremity injury to support clinicians in their understanding of SANE scores in this patient population. A primary finding from this study is that various constructs of health are accounted for when throwing athletes with upper extremity injuries complete the SANE. Specifically, the results indicate that the FAST total score accounted for 32.9%, the GRODA accounted for 11.6%, and the DASH total score accounted for 4.6% of the variance in the SANE. Collectively, this grouping of PROs accounts for about 49% of the variance in the SANE. This suggests that constructs of the FAST, GRODA, and DASH may be

Table 3. Summary Statistics for the SANE, FAST, DASH, and GRODA Scores of Baseball and Softball Athletes With Upper Extremity Injuries (N = 55)

PRO Measure ^a	$\text{Mean} \pm \text{SD}$	Range
SANE	74.4 ± 15.1	30–100
FAST	32.4 ± 19.7	0–88
DASH	13.6 ± 9.9	0-44.8
GRODA	2.0 ± 0.9	1–4

Abbreviations: DASH, Disabilities of the Arm, Shoulder, and Hand; FAST, Functional Arm Scale for Throwers; GRODA, Global Rating of Daily Activities; PRO, patient-reported outcome; SANE, Single Assessment Numeric Evaluation.

^a For the SANE, a higher score indicates a better rating of health. For the FAST, a lower score indicates higher health-related quality of life. For the DASH, a lower score indicates a lower level of disability. For the GRODA, a lower score indicates better or less disability.

considered by these athletes when responding to the SANE, which asks: "On a scale of 0 to 100, my injured body part is

out of 100," where 0 is no use of my injured body part, and 100 is full use of my injured body part.¹⁴ Therefore, even though the SANE is a global, single-item question, it may capture multiple constructs of health.

The SANE is a popular PRO used in busy orthopaedic, physical therapy, and athletic training clinics because of its ability to evaluate patients' current perceptions of their condition from a global perspective quickly and easily. Previously, it was thought that global or generic scales should be directed at 1 specific dimension of a patient's health; however, researchers have established the value and validity of the SANE with several multi-item region- and diseasespecific PROs in a variety of populations with upper and lower extremity orthopaedic injury, which is why is it recommended as the minimum PRO measure to collect from patients with shoulder conditions when challenged with a common barrier of time.^{7,15–17,20,25–27} When interpreting a patient's SANE, the specific phrasing of the question is important because it may affect how patients reflect on the question or the constructs they consider when answering.²⁵ For example, 1 version of the SANE asks patients to compare the injury between a previous health state and a current one, specifically, "If your [body part] was 100% before injury, what would you rate it now?"¹⁶ Asking patients to compare states of health is a complex cognitive task that may be difficult for some.^{16,25} It can also be challenging to accurately recall a previous status and compare it with their current status because the experiences and perspectives relevant to health change over time.²⁵ Another version of the SANE asks patients to reflect on a specific construct of health. This question is worded as, "On a scale of 0-100, how would you rate your [body part's] function, with 100 being normal?"^{17,28,29} In the current study, the SANE wording used was: "On a scale of 0 to 100, my injured body part out of 100," where 0 is no use of my injured body is part, and 100 is full use of my injured body part. Answering this version of the SANE did not require patients to compare current health with prior health and did not include a specific reference to function. Before using this PRO, we suggest clinicians review the wording to ensure that the version of the SANE selected will produce the desired information. Also, in the current study, we used the

SANE with generic wording (ie, no comparison and no focus on a single construct of health), so other versions of the SANE may not be related to the FAST, GRODA, or DASH in the same manner.

Because the SANE can be used as an efficient PRO during care, it is important to understand what patients consider when answering the question. Such information may increase the value of the SANE for clinicians who use it to make care decisions, especially decisions related to ADLs. The GRODA is a global assessment of ADLs that uniquely accounted for 11.6% of the variance in the SANE. The DASH evaluates disability and symptoms related to ADLs that require varying amounts of upper extremity involvement and uniquely accounted for 4.6% of the variance in the SANE. This finding suggested that patients' perceptions of their ability to successfully perform ADLs are important and multifactorial constructs that contribute to their overall health and well-being. Therefore, clinicians treating throwing athletes with upper extremity injuries, particularly in a secondary school setting, are cautioned to not overlook the importance of the ability (or inability) to perform ADLs when evaluating health and recognize the effect of ADLs when interpreting the SANE. Unlike the GRODA and DASH, the FAST evaluates multiple domains of health that emphasize patients' identities related to their sport and role on the team; it accounted for almost 33% of the variance in the SANE. The injured throwing athletes included in the current study tended to have mild to moderate shoulder and elbow injuries that often allowed for some level of sport participation during care. Based on this patient profile, perceptions of their health were significantly associated with multidimensional constructs related to functional and sport activities. Collectively, these findings reinforced the notion that injury in athletes affects the whole person and that athletes with these injuries require support and rehabilitation goals related to their daily and sport activities.

In addition to increased awareness that injuries in throwing athletes affect their daily and sport lives, it is important to consider how to use the SANE in patient care, especially in regard to the findings from this study. Clinicians may interpret a high SANE score as an indicator that the patient is doing well across multiple domains of health and therefore may be ready to progress toward more advanced aspects of rehabilitation. Conversely, if a patient's SANE score is low and suggests a poorer perception of health, clinicians may consider pausing care to determine which construct(s) of health are affecting the patient the most before making modifications to the care plan. One approach to learn more about why the patient gave a low score is to have a conversation with the patient. By using PROs to obtain a quantitative measure of health, clinicians may be initiating dialog with patients about sensitive topics in a deeper and more focused manner.^{15,17,27} According to Rotenstein et al, clinicians who used PROfacilitated conversation reported improved understanding about care options that mattered to the patient and recognized that their own assumptions often differed from the patient, which resulted in better shared decision-making.²⁷

Another approach for gaining insight into factors affecting the patient most is to administer 1 or more multi-item PROs that incorporate multiple constructs of health. Clinicians can use the total, subscale, and responses on individual items to identify more specific areas of health most affected from the patient's perspective. Many things should be considered

when deciding which PRO measure to use, such as how it relates to the specific concerns of the athlete. Two PROs (FAST and DASH) in the current study warrant consideration for throwing athletes given their focus on the upper extremity and sport activities and the finding that patients reflect on health dimensions captured in these PROs when completing the SANE. If a throwing athlete experiences a severe injury that requires removal from participation, the DASH may provide insight about specific aspects of the patient's disability and symptoms that are most problematic for ADLs. However, if the throwing athlete is still participating in functional and sport-specific activities or preparing to participate, consider using the FAST because it is region- and population-specific and incorporates sport and nonsport aspects of health. As an objective assessment, the FAST addresses more dimensions of health along the disablement continuum than many upper extremity PROs, including the DASH. With its emphasis on pain (impairment), throwing (sport function), ADLs (nonsport function), psychological effect, and advancement (societal limitations), the FAST is a useful measure for evaluating the whole person and identifying the health constructs of most concern to the patient.^{12,13} Further, patient responses can be tallied for a total score, and responses on individual items can be reviewed to understand the dimension(s) of health most affected. Thus, combining the FAST and DASH as follow-up assessments when scores on the SANE suggest poor ratings of health may facilitate conversations between the clinician and patient, building a stronger clinician-patient relationship and promoting opportunities for shared decision-making.

Although our results for the FAST, GRODA, and DASH show that throwing athletes with upper extremity injuries use multiple constructs of health to answer the SANE, collectively, these 3 PROs only accounted for 49.2% of the variance. The remaining 50.8% of the SANE's variance in the current study was not captured, meaning that some constructs captured by the SANE are not reflected within the FAST, GRODA, and DASH as well as measurement error and other variables not explored as possible predictors. The unexplained variance warrants investigation to build a more complete picture of constructs reflected upon when completing the SANE. For example, we did not have a single-item PRO to evaluate pain, yet pain is included in both the DASH and FAST. Similarly, functional ability is a component of the DASH, FAST, and GRODA but may warrant more explicit study given the high functioning of this patient population. Greater understanding of SANE scores and its ability to capture contributing health constructs may also come with studying the effect of patient and injury characteristics on responses, such as when PROs are administered during care (early versus late rehabilitation), mental health and wellness status, and aspects related to social determinants of health.

Although the bivariate correlation between the SANE and DASH was negative in the current study, as expected, the coefficient for the DASH predicting the SANE in the regression equation was positive. Given the substantial correlation between the FAST and DASH (r = 0.66), a suppressor effect was likely,³⁰ where the variance of the FAST and DASH shared with the SANE was assigned to the FAST regression coefficient in the multiple regression because of its greater predictive power. Thus, the residual variance that the DASH shared with the SANE (after partialling out the FAST) was positively correlated with the SANE. To clarify, when interpreting a model that exhibits a suppressor effect, an option is to remove 1 of the problematic variables; another is to perform a factor analysis and use those factor scores as predictors.³⁰ In our exploratory analysis, we chose to retain both the FAST and DASH in the model to highlight the fact that, even though they are somewhat redundant in their prediction of the SANE, the DASH accounted for additional variance in the SANE that the FAST and GRODA did not.

Limitations of the current study should be considered. Our results were based on patient perceptions from 55 athletes with upper extremity injuries, where most injuries were mild in severity, involved the shoulder, and occurred in secondary school male baseball players. It is unknown whether the constructs patients reflect upon when answering the SANE vary based on demographic and injury characteristics, so these variables should be investigated in future studies. Another limitation is that the PROs included in the current study represent patient perceptions at the first administration postinjury and do not reflect different time points during care or specific phase of rehabilitation. When patients reflect on a single question about their health, researchers have indicated they may prioritize or gravitate toward different constructs of health based on where they are in their recovery.^{15,17} Additionally, PRO measures in the CORE-AT EMR are designed to populate in a similar manner across patients, but patients possibly completed them in a different order or had response fatigue toward the end of a single session completing the PRO measures, which may account for the truncated range of the GRODA scores in the sample. These data may not reflect outcomes from athletic trainers who do not collect PROs or collect fewer PROs at one time. Despite these limitations, the PRO measures provide important assessment information from the patient that supports whole-person patient-centered care.

CONCLUSIONS

In the current study, we found that high school-aged baseball and softball throwing athletes likely consider multiple constructs of health when they score the SANE during care. Specifically, domains represented by the multi-item FAST (sport and nonsport pain, throwing, ADLs, psychological effect, and advancement) and DASH (physical disability and symptoms of ADLs) and by the single-item GRODA (nonsport function) captured approximately 49% of the variance in SANE ratings. Use of PRO measures during patient care supports a therapeutic alliance between patient and clinician, but the information obtained must be interpretable and easy to use to be helpful. In this modest study, we provide initial evidence to suggest that, when high school-aged throwing athletes complete the SANE, they reflect on more than 1 construct of health. Understanding this potential should help guide clinicians in their interpretation of the SANE and in their approach to next steps in care for the patient.

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