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Family contributions to sport performance and their utility in predicting appropriate referrals to mental health optimization programmes

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ABSTRACT
Limited research has examined the contributions of sport-specific family relationship problems to athlete mental health. In the current study we examined the extent to which collegiate athletes’ family problems (as measured by the Student Athlete Relationship Instrument factors, SARI) predict athletes’ general mental health distress and specific mental health symptoms that are relatively common in athletes (i.e. depression, anxiety, and drug and alcohol use). The study included 85 collegiate athletes (intramural, n = 26; club sport, n = 12; NCAA Division I, n = 47). We hypothesized that both general mental health distress and commonly evidenced mental health symptoms would be predicted by athletes’ responses to the SARI factors (Poor Relationship and Lack of Support, General Pressure, Pressure to Quit or Continue Unsafely, Embarrassing Comments, and Negative Attitude). Results indicated that all of the aforementioned SARI factors predicted athletes’ ratings of depression and general mental health distress levels. Only the General Pressure SARI factor predicted athletes’ anxiety and drug use. Alcohol use was not predicted by any of the SARI factors. Receiver operating characteristic (ROC) analyses indicated that sport-specific problems in family relationships provided a good classification of athletes at risk for general mental health distress, depression, and anxiety. Practice implications are discussed in light of the results.

Keywords: Athletes, screening, family relationships, mental health, substance use

Highlights
- Athletes’ negative relationships with family members predict higher levels of depression and mental health distress.
- General Pressure from athletes’ family members predict higher ratings of anxiety and mental health distress.
- Receiver operating characteristic analyses demonstrate that reports of negative family relationships can be used to identify athletes at risk for mental health conditions, such as depression and anxiety.

Collegiate athletes experience different stressors than their non-athlete counterparts, such as intense exercise, lack of energy, financial difficulties from lack of occupational opportunities, long periods away from school for travel requirements, and competing responsibilities in athletic and other life domains (Brewer & Petrie, 2014; Donohue et al., 2015; Rao & Hong, 2016). In addition to unique stressors, collegiate athletes are at risk for a number of mental health difficulties (most often depression, anxiety, and substance use) that may negatively impact sport performance and may warrant referral to psychological services in an effort to optimize sport performance outcomes (Gorczynski, Coyle, & Gibson, 2017).

Athletes’ rates of depression are estimated to be approximately 21%, which is markedly higher than the rates in the non-athlete population (approximately 7%; American Psychiatric Association, 2013; Du Preez et al., 2017). Although exact rates of athlete anxiety are difficult to pinpoint due to differing definitions of anxiety in the context of sport (e.g. post-competition anxiety, performance anxiety), there is an abundance of literature suggesting that athletes experience unique stressors that may contribute to significant anxiety that affects sport performance (Patel, Omar, & Terry, 2010; Storch, Storch, Killiany, & Roberti, 2005). Athletic stressors, including general pressure, injury, and performance that does not meet expectations, may impact the development of mental health difficulties (Rao & Hong, 2016). Despite the high prevalence rates of impactful mental health
difficulties, athletes are under immense pressure to perform and are likely to under-report symptoms and avoid seeking out psychological services due to perceived stigma associated with mental health difficulties, as well as lack of insight that mental health symptoms can impact performance (Beauchemin, 2014; Patel et al., 2010; Rao & Hong, 2016; Stoebner, Otto, Pescheck, Becker, & Stoll, 2007).

In addition to symptoms of depression and anxiety, athletes’ misuse of alcohol and drugs is also concerning. Compared to the general college population, collegiate athletes display greater misuse of substances (Rao & Hong, 2016; Yusko et al., 2008). Increased use of alcohol among student athletes may be associated with an increase in the use of other substances (McCabe, Brower, West, Nelson, & Wechsler, 2007). Athletes’ drug use rates are generally similar to that of the non-athlete population (Yusko et al., 2008). However, there appears to be a significantly greater off-season use of illicit drugs compared to in-season use (Yusko et al., 2008). This may be due to drug screening policies of collegiate competitive sport organizations, such as the National Collegiate Athletic Association (NCAA). Interestingly, however, the prevalence of marijuana use among athletes has been found to be lower than among non-athlete peers, which has been hypothesized to be due to athlete knowledge of the harmful athletic effects of smoking on performance (Yusko et al., 2008).

Research has shown that athletes’ relationships with teammates and coaches are integral to athletic wellbeing and ability to perform in sport (Butt, Weinberg, & Culp, 2010; Raabe, Zakrjesk, & Readdy, 2016). Relatively, athletes cite family members as being most influential to sport success (Donohue, Miller, Crammer, Cross, & Covassin, 2007; Tamminen & Holt, 2012). Indeed, receiving support from parents is associated with lower levels of stress and increased motivation, and positive family relationships are associated with lower levels of worry, lower anxiety about sport performance, decreased delays in injury recovery, and lower likelihood to use performance-enhancing drugs (Erickson, Backhouse, & Carless, 2017; Tamminen & Holt, 2012). Thus, the family can create an environment that can either motivate sport performance or become overly evaluative, negative, and threatening (Gould, Lauer, Rolo, Jannes, & Pennisi, 2008; O’Rourke, Smith, Smoll, & Cumming, 2011; Smoll & Smith, 2002). Moreover, negative family relationships, in general, can impact the development of maladaptive mental health symptoms and dysfunctional behaviours in sport (Erickson et al., 2017; Rao & Hong, 2016; Stoebner et al., 2007). However, there is a lack of research examining how sport-specific aspects of family relationships influence athletes’ mental health.

Early identification of athletes who are at risk for mental health difficulties can be beneficial for long-term outcomes, including sport performance optimization (Kroshus, 2016). Given the prevalence and comorbidity of athletes’ mental health concerns, screening measures specific to this population are of great importance. Currently, the most widely used systematic screening physical exam for collegiate athletes is the Pre-participation Examination (PPE; Carek & Mainous, 2003). Results of the PPE may disqualify an athlete from participating in sport or provide direction for necessary accommodations required for participation. Although it is recommended that the PPE include a screening for mental health concerns, a recent report indicates that less than half of all institutions who use the PPE to screen for athletes’ physical health include a screening for athletes’ mental health (Kroshus, 2016; National Collegiate Athletic Association [NCAA], 2013). Moreover, screening for athlete mental health concerns has specific challenges because symptoms of mental health difficulties (e.g. fatigue) may be normative or adaptive in sport participation, and not indicative of a mental health condition (Kroshus, 2016). Additionally, athletes may be less likely to report mental health concerns, but more likely to report family relationship problems, which can be helpful when trying to identify a screening method for identifying at-risk athletes (Gulliver, Griffiths, & Christensen, 2012; Kroshus, 2016).

When selecting a screening measure for a specific population or disorder or constellation of symptoms, receiver operating characteristic (ROC) analyses may be utilized to help determine if a potential screening instrument is able to identify true cases of the disorder better than chance. ROC analyses provide a measure of this classification accuracy called the area under the ROC curve (AUC), which is a measure of the screening instrument’s ability to distinguish between those who do and do not have the disorder in question. ROC analyses also provide diagnostic likelihood ratios (DLR). DLRs represent how many times more (or less) likely an individual who has a condition (e.g. depression) would be to obtain a certain score than an individual without that condition. Specifically, DLRs between 0 and 1 indicate a decrease in the likelihood of the disorder...
being present, while DLRs greater than 1 are associated with an increase in the likelihood that the individual has the disorder in question, with higher DLRs indicating stronger associations (Deeks & Altman, 2004). DLRs are useful for clinical decision making when used in conjunction with a positive predictive value (PPV) based on an individual’s score (Deeks & Altman, 2004). The PPV is an accuracy statistic that indicates how many true positive cases were correctly identified as having the disorder in question. DLRs are beneficial in clinical decision making because clinicians can use the pre-test prevalence rate of the disorder and combine that with the DLR for a given screening test score to determine the post-test probability (using a probability nomogram) that the individual has the disorder in question (Straus, Glasziou, Richardson, & Haynes, 2011; Youngstrom, 2014). Use of DLRs, PPVs, and a nomogram results in diagnostic accuracy that is superior to clinical intuition (Jenkins, Youngstrom, Washburn, & Youngstrom, 2011).

Theoretically, given the abundant research suggesting the importance of family relationships on mental health in athletes, family relationships may themselves be useful for identifying athletes at increased risk for negative athletic performance outcomes. Therefore, the current study was conducted to (1) identify aspects of sport-specific family relationship problems that predict collegiate athletes’ general mental health distress and four frequently identified mental health concerns that have been reported to occur in athletes (i.e. depression, anxiety, and drug and alcohol use), and to (2) determine sport-specific family relationship problems that may be used to identify athletes who are appropriate for mental health programming.

Method

Participants

Athletes were recruited to participate in a controlled evaluation of campus counselling services as usual to The Optimum Performance Program in Sports (TOPPS; see Donohue et al., 2018 for details regarding the treatment outcome study). TOPPS is an intervention that focuses on sport performance optimization while considering sport culture in its protocols. TOPPS utilizes a strengths-based family behaviour therapy framework. Thoughts, feelings, and behaviours are conceptualized to reciprocally influence sport performance. Cognitive and behavioural skill sets are targeted to assist optimization (non-optimal to optimal). In the current study athletes were required to (a) be at least 18 years old; (b) endorse drug or alcohol use in the past 4 months; (c) anticipate enrollment in the university for at least 8 more months; (d) have at least one adult significant other (e.g. parent, partner) willing to participate in treatment; and (e) currently not be receiving formal psychotherapy. Athletes from all sport status categories were recruited for the treatment outcome study in an attempt to gain insight into treatment response across varying levels of play (i.e. NCAA, club, intramural). Thus far, there have been no published differences between these groups in their pursuit of mental health services (Uphill, Sly, & Swain, 2016). Researchers have recommended that there be a consistent definition of athletes in the literature, and that more studies examine mental health issues in specified sub-groups (Araujo & Scharhag, 2016; Uphill et al., 2016). Consistent with these recommendations, the current sample included 85 student athletes (intramural, n = 26; club sport, n = 12; NCAA Division I, n = 47) enrolled in a southwestern university in the United States. Participants were 20.4 years old on average (SD = 2.2) and 51.8% were male (n = 44). Ethnicity of the athletes in the sample is as follows: 40% Caucasian (n = 34), 20% Black/African American (n = 17), 21.2% Hispanic/Latino (n = 18), 10.6% Asian American (n = 9), 2.4% Pacific Islander (n = 2), and 5.9% Multiple/Other (n = 5).

Procedure

Participants were recruited via referrals from the athletic department (e.g. medical staff, office of student conduct, athletic trainers), coach and teammate referrals, and presentations about the larger treatment outcome study at athletic and campus events. Athletes were randomized as a part of referral to receive either a prescribed engagement interview or engagement as usual to assess the efficacy of participation engagement methods (for details, see Donohue et al., 2016). After participants were recruited and determined to meet the outcome study criteria, they completed informed consent and baseline measures for participation in the controlled treatment outcome study. Data for the current study were derived from this baseline assessment. Clinical psychology doctoral students were trained to administer the assessment measures and were supervised by a licenced clinical psychologist. All assessment procedures were conducted in a research lab operating independently from the treatment programme. Assessment measures were completed individually on a computer by athletes. Participants received $25 monetary compensation for their time completing the assessment measures. This study was approved by the institutional review board.
Measures

Family relationship information was obtained from the Student Athlete Relationship Instrument (SARI; Donohue, Miller, Crammer, Cross, & Covassin, 2007), a self-report measure that includes 63 items assessing sport-specific relationship problems with teammates, family members, coaches, and non-athlete peers. To these authors’ knowledge, the SARI is the only instrument specifically designed to assess relationships in the context of athletes and their sport performance. Although the athletes completed the entirety of the SARI (including teammate, coach, and non-athlete peer-related questions) for the baseline measures of the treatment outcome study, only the family relationship items were utilized for these analyses. Athletes rate SARI items on a 7-point Likert scale from 1 (extremely disagree) to 7 (extremely agree). The 16 SARI family-related items underscore four factors: Poor Relationship and Lack of Support (e.g. I don’t get enough encouragement from my family members), General Pressure (e.g. At least one of my family members puts too much pressure on me), Pressure to Quit or Continue Unsafely (e.g. At least one of my family members encourages me to take performance enhancers), and Embarrassing Comments and Negative Attitude (e.g. At least one of my family members consistently has a negative attitude with me). These four factors have high internal consistencies (Cronbach’s α), between .87 and .96 (Donohue et al., 2007). Factor scores are computed by taking the average of the responses for each of the items in the factor (five, six, three, and two items, respectively).

The Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1994) is a commonly used instrument that assesses the intensity of a wide range of symptoms of psychological problems for the week prior to assessment. Mental health data for general mental health distress, anxiety, and depression symptoms were derived from the SCL-90-R Global Severity Index (GSI), Anxiety, and Depression subscales, respectively. Internal consistency of the SCL-90-R scales range from low to high (Cronbach’s α = .85 for Anxiety; Cronbach’s α = .90 for Depression) and retest-reliability is high between .80 to .90 (Derogatis, 1994). Self-reported drug and alcohol use over the past 120 days was obtained from the Timeline Followback Assessment (TLFB; Sobell, Maisto, Sobell, & Cooper, 1979). The number of days using alcohol and days using illicit drugs (e.g. marijuana and other non-prescribed drugs) were used to operationalize frequency of substance use in the current study. Test-retest reliability for the TLFB ranges between .75 and .98 (Robinson, Sobell, Sobell, & Leo, 2014; Sobell, Sobell, & Klajner, 1986).

Statistical plan

The recommendations of Tabachnick and Fidell (2013) were used to inform transformation of the following variables to correct skewness and kurtosis: The number of drinks and the SARI factor Pressure to Quit or Continue Unsafely were transformed using a square root transformation, and the days of drug use was transformed using a logarithmic transformation. Given the scientific literature regarding family influence on sport performance, it was hypothesized that all family factors would predict ratings of (1) general mental health distress, (2) depression, (3) anxiety, (4) alcohol use, and (5) drug use. Five separate hierarchical multiple regressions were performed to determine what factors of sport-specific family relationship problems predicted each of these separate aspects of mental health. Prior to the main analyses, the group means were compared using a one-way MANOVA to determine if any of the predictor or criterion variables differed between athlete groups (NCAA, Club, and Intramural). Significant differences were noted for the following variables: SCL-90-R Depression (F(2, 82) = 3.87, p < .05); SCL-90-R Anxiety (F(2, 82) = 3.54, p < .05); SCL-90-R GSI (F(2, 82) = 5.18, p < .05); and TLFB Drinks (F(2, 82) = 3.69, p < .05). Group means are presented in Table I. As a result of these differences, gender and sports status were entered in the first step of the hierarchical multiple regression to control for observed and potential differences these variables could have on prediction of the criterion variables, and the SARI General Pressure factor score was entered before the other SARI scores, based on the literature indicating that general pressure has the greatest impact on the criterion variables (Erickson et al., 2017; Rao & Hong, 2016; Stoeber et al., 2007).

In addition to these analyses, ROC analyses were used to evaluate whether the SARI could be useful for identifying athletes who were at increased risk for negative mental health outcomes due to family problems. ROC analyses were performed for the SARI Family Relationship total score. For the ROC analyses, participants were divided into Low- and High-concern for the clinical symptoms, with higher T-scores on the SCL-90-R indicating athletes who are experiencing more symptoms that would raise a level of clinical concern in a referral setting. Participants were divided using a median split (the median T-score was 55). Although the SCL-90-R manual recommends the use of T-scores above 65 to represent levels of clinical concern, a median split was utilized for the current study due to the uneven distribution of scores when split based on manual recommendations (Derogatis, 1994).
Table I. Demographics and one-way MANOVA results.

<table>
<thead>
<tr>
<th>Variable</th>
<th>NCAA</th>
<th>Club</th>
<th>Intramural</th>
<th>F</th>
<th>p</th>
<th>Significant difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEP</td>
<td>52.64 (11.16)</td>
<td>64.17 (16.60)</td>
<td>56.00 (14.00)</td>
<td>3.87</td>
<td>&lt;.05</td>
<td>Club &gt; NCAA</td>
</tr>
<tr>
<td>ANX</td>
<td>48.13 (10.20)</td>
<td>58.92 (15.97)</td>
<td>51.62 (15.03)</td>
<td>3.54</td>
<td>&lt;.05</td>
<td>Club &gt; NCAA</td>
</tr>
<tr>
<td>GSI</td>
<td>53.47 (10.30)</td>
<td>66.08 (13.03)</td>
<td>55.69 (14.58)</td>
<td>5.18</td>
<td>&lt;.01</td>
<td>Club &gt; NCAA &amp; Intramural</td>
</tr>
<tr>
<td>Drinks</td>
<td>46.19 (53.29)</td>
<td>101.75 (128.84)</td>
<td>46.48 (39.46)</td>
<td>3.69</td>
<td>&lt;.05</td>
<td>Club &gt; NCAA &amp; Intramural</td>
</tr>
<tr>
<td>Drugs</td>
<td>7.30 (19.74)</td>
<td>23.33 (52.57)</td>
<td>15.12 (32.00)</td>
<td>2.10</td>
<td>&gt;.05</td>
<td></td>
</tr>
<tr>
<td>PRLS</td>
<td>2.06 (1.13)</td>
<td>2.70 (1.52)</td>
<td>2.78 (1.59)</td>
<td>2.87</td>
<td>&gt;.05</td>
<td></td>
</tr>
<tr>
<td>GP</td>
<td>2.49 (1.43)</td>
<td>2.88 (1.10)</td>
<td>2.71 (1.48)</td>
<td>0.46</td>
<td>&gt;.05</td>
<td></td>
</tr>
<tr>
<td>PQCUC</td>
<td>1.40 (0.56)</td>
<td>1.72 (0.85)</td>
<td>1.85 (1.23)</td>
<td>2.42</td>
<td>&gt;.05</td>
<td></td>
</tr>
<tr>
<td>ECNA</td>
<td>2.10 (1.50)</td>
<td>2.21 (1.67)</td>
<td>2.13 (1.55)</td>
<td>0.03</td>
<td>&gt;.05</td>
<td></td>
</tr>
</tbody>
</table>

Note. n = 85. DEP = SCL-90-R Depression. ANX = SCL-90-R Anxiety. GSI = SCL-90-R Global Severity Index. Drinks = Timeline Follow Back Number of Drinks. Drugs = Timeline Follow Back number of days using drugs. PRLS = SARI Factor 1 (Poor Relationship and Lack of Support). GP = SARI Factor 2 (General Pressure). PQCUC = SARI Factor 3 (Pressure to Quit or Continue Unsaftely). ECNA = SARI Factor 4 (Embarrassing Comments and Negative Attitude).

Results

Prediction of general mental health distress, depression, and anxiety. Three separate hierarchical multiple regression analyses were conducted. First, we determined if the addition of General Pressure and then the three other SARI factors (Poor Relationship and Lack of Support, Pressure to Quit or Continue Unsaftely, and Embarrassing Comments and Negative Attitude) improved the prediction of severity of general mental health distress (SCL-90-R GSI), depression, and anxiety over and above gender and sport status alone. See the first section of Table II for full details on the regression models. The full model of gender, sport status, General Pressure, Poor Relationship and Lack of Support, Pressure to Quit or Continue Unsaftely, and Embarrassing Comments and Negative Attitude (step 3) was statistically significant in the prediction of GSI ($p < .001$), depression ($p < .001$), and anxiety ($p < .001$). The addition of General Pressure, Poor Relationship and Lack of Support, Pressure to Quit or Continue Unsaftely, and Embarrassing Comments and Negative Attitude to the prediction of GSI (steps two and three) led to statistically significant increases in $R^2$ for GSI ($p < .001$ and $p < .05$, respectively) and depression ($p < .001$ and $p < .05$, respectively). For anxiety, the addition of General Pressure (step two) led to a statistically significant increase in $R^2$ ($p < .001$); however, the addition of Poor Relationship and Lack of Support, Pressure to Quit or Continue Unsaftely, and Embarrassing Comments and Negative Attitude (step three) did not lead to a statistically significant increase in $R^2$ ($p > .05$).

Substance use. When predicting illicit drug use, the full regression model which includes gender, sport status, and the four SARI factors (step three) was not statistically significant ($p > .05$; see Table II). The model for step two was statistically significant ($p < .05$), but the addition of General Pressure (step two), and the other 3 SARI factors (step three) did not lead to a statistically significant increase in $R^2$ ($p > .05$). When predicting alcohol use, however, the addition of General Pressure to the prediction of TLFB Drinks (step two) did lead to a statistically significant increase in $R^2$ ($p < .05$), even while the partial (step 2) and full regression models (step three) were not statistically significant predictors of alcohol use ($p > .05$).

ROC Analyses. Differences in sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were examined for the SARI. Specifically, sensitivity represents the ratio of true positive cases over true positive and false negative cases, and specificity is the ratio of true negative cases over true negative and false positive cases (Stojanovic et al., 2014). The PPV is an accuracy statistic that indicates how many identified positive cases actually have the condition in question (e.g. depression), whereas the NPV is the accuracy statistic that indicates how many identified negative cases actually do not have the condition in question (Stojanovic et al., 2014). AUC was used as a measure of the SARI’s ability to distinguish between low concern and high concern athletes, with AUC of 0.50 indicating chance classification and 1.00 indicating perfect classification (Hosmer, Lemeshow, & Sturdivant, 2013). Optimal cut scores were identified using Youden’s Index, which is sensitivity + specificity – 1 (Fluss, Faraggi, & Reiser, 2005).

Figure 1 presents ROC curves for the SCL-90-R Depression and Anxiety subscales, as well as the Global Severity Index, and Table III presents the sensitivity, specificity, PPV, NPV, number of correct classifications, and DLR for each analysis. Substance abuse variables were not included in the ROC.
analyses given the nonsignificant regression analyses. Asymptotic significance levels indicated that the SARI provided significantly better classifications than a chance for all three SCL-90-R factors. Results indicate that, in identifying athletes of high concern for experiencing symptoms of depression, anxiety, and general mental health distress that may require referral to treatment, the SARI had AUCs of .76 and above, which is significantly better than chance based on asymptotic significance levels ($p < .01$).

### Discussion

The current results indicate that General Pressure from family members contributed a significant amount of variance to the model of athlete depressive symptoms, suggesting that as family pressure increases, athletes may report more severe symptoms of depression. Other factors of sport-specific problems in family relationships (i.e. Poor Relationship and Lack of Support, Pressure to Quit or Continue Unsafely, and Embarrassing Comments and Negative Attitude) also predicted athletes’ depressive symptoms, which is consistent with our initial hypothesis that all SARI factors would predict athlete depression. These results are consistent with past research suggesting that family relationships in general are predictive of increased depression symptoms (Du Preez et al., 2017; Rao & Hong, 2016).

In the current study, this negative predictive relationship of poor sport-specific problems in family relationships on depressive symptoms occurred even after important demographic variables were considered, including gender and sport status (e.g. NCAA, intramural, and club levels), which is a unique contribution to the literature.
Figure 1. Receiver operating characteristic curves for SCL-90-R Depression, Anxiety, and Global Severity Index.
Note: SARI = Student Athlete Relationship Instrument. TPF = True Positive Fraction. FPF = False Positive Fraction. TOTAL = Average SARI score across all four SARI factors. Parenthetical values indicate Area Under the Curve (AUC) for each factor.

Table III. Classification accuracy statistics and area under the curve (AUC) for SCL-90-R Depression, Anxiety, and Global Severity Index.

<table>
<thead>
<tr>
<th>SARI score</th>
<th>TP</th>
<th>FP</th>
<th>TN</th>
<th>FN</th>
<th>Sn</th>
<th>Sp</th>
<th>PPV</th>
<th>NPV</th>
<th>DLR b</th>
<th>AUC [95% CI]</th>
<th>SE of AUC</th>
<th>p*</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCL-90-R Depression</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4.00</td>
<td>41</td>
<td>31</td>
<td>13</td>
<td>0</td>
<td>.30</td>
<td>.57</td>
<td>1</td>
<td>1.42</td>
<td></td>
<td></td>
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<tr>
<td>5.90</td>
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<td>.90</td>
<td>.59</td>
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<td>.87</td>
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<td><strong>8.83</strong></td>
<td><strong>30</strong></td>
<td><strong>10</strong></td>
<td><strong>34</strong></td>
<td><strong>11</strong></td>
<td><strong>.73</strong></td>
<td><strong>.77</strong></td>
<td><strong>.75</strong></td>
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Note: TP = number of true positive classifications. FP = number of false positive classifications. TN = number of true negative classifications. FN = number of false negative classifications. Sn = Sensitivity. Sp = Specificity. PPV = Positive Predictive Value. NPV = Negative Predictive Value. SARI = Student Athlete Relationship Instrument. The Total Score can range from 4 to 28. DLR = Diagnostic Likelihood Ratio. SE = Standard Error. AUC = Area under the curve.

*Bolded scores represent the optimal cut score as determined by Youden’s Index. b The probability of a high concern athlete being correctly classified into the high concern group for depression, anxiety, and overall mental health symptoms, respectively.

*Asymptotic significance level.
Moreover, negative sport-specific family relationships associated with General Pressure significantly predicted higher ratings of anxiety symptoms in collegiate athletes, above and beyond gender and sport status. This is somewhat inconsistent with our hypothesis that all SARI factors would predict athlete anxiety symptoms in that General Pressure was the only SARI factor that demonstrated a significant increase in the variance explained. However, other aspects of sport-specific problems resulting from family relationships may still be important bivariate predictors of anxiety and other negative outcomes (Stoeber et al., 2007), even though they were not significant predictors in this multivariate model.

General Pressure from family members that contributed to sport problems was the strongest predictor of general mental health distress, demonstrating that athletes’ severity of reported general mental health distress increased in accordance with the amount of pressure that they reported feeling from their family. These results apply even after gender and sport status are considered. Other factors, including lack of support, pressure to quit or continue unsafely, and negative attitude, also predicted athletes’ severity of mental health symptoms reported, although not to the same extent as General Pressure. These results were consistent with our hypothesis that all SARI factors would predict general mental health distress. Results from the current study provide new insight into the relationship between family function that is specific to perceived problems in sport and mental health in athletes, as it was determined that negative sport-specific problems in family relationships do indeed predict greater severity of athletes’ general mental health symptomology.

Interestingly, in this sample, negative sport-specific problems due to family relationships were not predictive of athletes’ reported alcohol use, which was inconsistent with our initial hypothesis that family relationships would predict athlete alcohol use. However, General Pressure from family contributed a significant, albeit small, increase in the variance explained. The combination of gender, sport status, and General Pressure significantly predicted athletes’ reported drug use, which was not consistent with our hypothesis that all SARI factors would predict athletes’ drug use. Thus, General Pressure may be a factor that influences athletes’ use patterns, although these results are less consistent than is the case for other mental health outcomes in this study (i.e. depression, anxiety, and overall mental health distress). These results appear to be consistent with past research showing that pressure from family in general life scenarios may lead to positive attitudes towards performance-enhancing drug use (Madigan, Stoeber, & Passfield, 2016). However, results are inconsistent with research suggesting that other family relationship factors (e.g. poor relationship with family) increase substance use (Blank et al., 2015; Erickson et al., 2017; Lee, 2011).

The current results help to elucidate the relationship between General Pressure as well as other negative sport-specific family relationship factors and mental health outcomes. Knowledge in this area can serve to further the development of performance optimization interventions for athletes by helping to identify potentially problematic sport-specific family patterns that may be addressed in treatment planning. Identifying aspects of sport-specific family relationship problems that contribute to problematic mental health symptoms is a first step in developing interventions that target these poor outcomes. The current research furthers understanding in this area by identifying aspects of family relationships, such as General Pressure, that may help to improve mental health outcomes in this population.

In addition to identifying family relationship predictors of mental health and substance use outcomes, the current study also demonstrated that family relationship difficulties, as measured by the SARI, are useful for identifying student athletes who are at increased risk for elevations in depression, anxiety and general mental health distress symptoms. ROC analyses indicated that the SARI provided good discrimination between low- and high-risk athletes as indicated by AUCs greater than .76. Additionally, the SARI significantly improved classification over chance classification rates. The current ROC results were obtained utilizing a median split at sub-clinical levels of symptoms (rather than a split based on clinical levels, i.e. T-scores at or above 65), because of the uneven sample distribution of clinical level scores, which might have artificially inflated results. Even so, these results indicate that the SARI can be used as a screening measure to identify athletes who are at risk for mental health difficulties by choosing cut off scores that are appropriate for a specific site. Optimal cut-off scores for identifying at-risk athletes should be made based on several factors, and so the cut scores identified in the current study should not be considered universal. When selecting appropriate cut off scores, it is important to consider the cost for possible incorrect identification of at-risk athletes, the base rate of depression, anxiety, and general mental health distress in the population, the referral question or the purpose of screening, and the incremental validity added to the classification of at-risk athletes. One limitation of using DLRs in making screening and referral decisions is that there is a chance of false positive or false negative classification based on the cut off score that is identified. Even given this chance, proper use of DLRs and
nomograms in clinical decision making is superior to clinical intuition (Jenkins et al., 2011).

Taking these factors into consideration, the current results suggest that the SARI may be useful as a systematic screening measure to identify athletes at risk for increased mental health difficulties that may require further evaluation or treatment. For instance, let’s say Joe, Emanuel, and Hector obtained SARI scores of 4, 9, and 12, respectively in a screen for depression. Using corresponding DLRs of 1.42, 3.34, and 7.51 (as per Table III), a practitioner could determine the post-test probability (based on pre-test prevalence rates of depression in the population) that one of these athletes may be struggling with symptoms of depression. In a sports-medicine clinic where the base rate of depression is 20%, DLRs of 1.42, 3.34, and 7.51 could be utilized on a nomogram (see Figure 2) to determine each athlete’s post-test probability of having depression. In this example, athlete Joe’s post-test probability rate of 25% would not be significantly higher than the 20% base rate of depression, whereas Emmanuel’s post-test probability would have a 45% chance of depression, and Hector would have a 70% chance of depression, which is markedly higher than the initial diagnostic information that was available (i.e. clinic base rate of 20%). These results would warrant time with Hector to clarify symptoms and make a plan for possible referral to treatment. Using the SARI as a brief screener, a clinician would have more information at the outset to determine which athletes may warrant extended time for in-depth assessment and possible treatment referral. Thus, the SARI may be particularly useful in determining

Figure 2. Nomogram for determining post-test diagnostic probability using DLRs with examples.
Note: DLR = Diagnostic Likelihood Ratio.
which athletes are at risk for the development of mental health concerns that may negatively impact sport performance. For a more in-depth discussion of clinical decision making using DLRs and nomograms, see Youngstrom (2014).

Due to the prevalence and comorbidity of athletes’ mental health concerns, screening measures specific to this population are of great importance. In particular, athletes may be less likely to report mental health concerns, but more likely to report family relationship problems, which supports the use of the SARI when considering screening measures for mental health concerns in athletes (Gulliver et al., 2012; Kroshus, 2016). Further research is needed to specifically demonstrate the efficacy of using sport-specific family relationship problems on the SARI to determine referral and treatment recommendations, and to determine if other sport-specific relationship problems (such as problems with team-mates and coaches, which are assessed with other SARI items) can also contribute. However, at this point, it seems that systematic implementation of sport-specific screening measures, such as SARI, to identify at-risk athletes would likely serve to decrease health burden, facilitate appropriate referrals to services, and decrease the negative impact that mental health concerns can have on performance.

Lastly, given the significance of family in the context of sport (based on past research and the current results), it is recommended that personnel involved in athlete referrals (e.g. Athletic Departments) consider the importance of involving significant others in treatment planning using evidence supported behavioural optimization interventions that incorporate family, such as TOPPS (Donohue et al., 2018). Although this recommendation is empirically justified, it is important to indicate that this recommendation may be difficult to implement because campus counselling programmes are traditionally focused on the implementation of individually-based therapies (Donohue et al., 2016, 2018).

Disclosure statement

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References


Youngstrom, E. A. (2014). A primer on receiver operating characteristic analysis and diagnostic efficiency statistics for pediatric psychology: We are ready to ROC. *Journal of Pediatric Psychology, 39*, 204–221. doi:10.1093/pepsy/jsu062