Psychosocial Adjustment in Males with Duchenne Muscular Dystrophy: Psychometric Properties and Clinical Utility of a Parent-report Questionnaire

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Objective
The primary aim of this study was to establish the psychometric properties and clinical utility of the Personal Adjustment and Role Skills Scale (PARS-III) for assessing psychosocial adjustment in males with Duchenne muscular dystrophy (DMD).

Methods
The parents of 287 male patients with DMD aged 5–18 years completed the PARS-III and Revised Rutter Scale.

Results
The α coefficients and factor analysis indicated good reliability and validity. Overall psychosocial adjustment was not significantly different in DMD compared to males with other chronic medical conditions and was positively associated with increases in age. A clinical cutoff score for screening in the DMD population is also reported.

Conclusions
The PARS-III is a reliable and valid index of youth psychosocial adjustment in DMD and can be used for both clinical screening and research purposes.

Key words
Duchenne muscular dystrophy; psychosocial adjustment; questionnaire study.
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Psychosocial adjustment can be defined as the adaptive response of children to chronic illness, and items are not anchored to specific behaviors, suggesting that more comprehensive assessment of psychosocial factors may be necessary in some clinical and research settings.

To address these limitations the Personal Adjustment and Role Skills Scale, 3rd edition (PARS-III) was specifically developed to measure psychosocial adjustment in children with chronic physical illnesses (Stein & Jessop, 1990). Psychosocial adjustment can be defined as the adaptive task of managing upsetting feelings and frustrations aroused by the illness, and preserving an emotional balance (Moos & Tsu, 1977). It is the outcome of a process in which children attempt to meet the demands of their illness with their emotional/social resources and coping patterns. Amongst other things, the PARS-III assesses peer relationships, independence, and participation in age-appropriate tasks; all of which appear to be particularly important domains related to the adjustment of children who have a chronic illness (Immelt, 2006; Witt, Riley, & Coiro, 2003), and which may vary in significance according to the age of the child. In addition, strength of the PARS-III is its exclusion of items based on physical symptoms, such as pain, fatigue, and headaches (Walker et al., 1990). The PARS-III has been used to assess psychosocial functioning in a variety of nonDMD chronic-illness populations with mixed results (Chernoff, Ireys, DeVet, & Kim, 2002; Harris et al., 1996; LeBovidge, Lavigne, & Miller, 2005; Witt et al., 2003). One of the shortcomings of the PARS-III is the lack of an established cutoff score. In the original study by Walker et al. (1990), a cutoff of 1 SD below the mean was proposed to identify subjects who were at an increased risk for adjustment problems as compared to their affected peers. The male participants’ mean score was 85.5; SD = 12.1 resulting in a cutoff score of 73. Based on these results, Witt and colleagues (2003) utilized a cutoff score of 73 for a different pediatric illness sample resulting in 11.1% of the children in their study being identified as having significant psychosocial adjustment problems. In another study, Chernoff et al. (2002) utilized
functioning, but there continues to be some debate regarding the impact of this treatment on behavioral functioning (Biggar, Harris, Eliasoph & Alman, 2006; Dubowitz, 2005; Hendriksen & Vles, 2008). Given the opportunity, we decided to examine this by conducting exploratory analyses comparing psychosocial adjustment in participants who are on steroid treatment and those who are not.

**Methods**

**Participants**

Parents of patients with DMD were recruited from members registered with two-parent advocacy groups, the Dutch and American Parent Project Muscular Dystrophy organizations. Representatives of the respective organizations contacted parents and requested their participation in the study via letter (Dutch), or e-mail (American). Parent Project Muscular Dystrophy (PPMD), founded in 1994, is a nonprofit grassroots parent organization focused entirely on Duchenne and Becker muscular dystrophies. Approval was obtained from the local ethics committee of Maastricht University, and information was provided in the letter or email that addressed requirements of adequate informed consent. Only boys with a diagnosis of DMD were included in the current study. Of the 112 Dutch parents who were contacted by a letter, 63 of them participated (56%) by completing the questionnaire. Of the 1,587 American parents contacted by e-mail, 351 of them participated (22%). The participating parents and their sons lived in areas spread throughout the Netherlands and the US. The mean age of the males was 11.9 (SD = 5.2), with a minimum age of 3 years and a maximum of 38 years. As 47 males were 18 years or older and thus in the adult age range they were excluded in further analyses. Also, the 17 boys aged 3 and 4 years were excluded from further analyses, as the PARS-III was not designed for this age group. The final sample consisted of 287 boys (mean age = 10.9; SD = 3.5). The mean age of initial DMD diagnosis was 3.8 years (SD = 2.0). Parents were asked to give their educational status (highest grade of school which they completed) on a 5-point scale ranging from “some high school or less” to “professional or graduate degree” as is done in the Child Health Questionnaire (Landgraf, Abetz, & Ware, 1999), as an estimate of their social–economic status. Kolmogorov–Smirnov test was performed to test whether the distribution of education was normal in both the US and Dutch sample. Educational status in the US sample (D[225] = 0.21, p < .001), and the Dutch sample (D[55] = 0.23, p < .001), were both negatively skewed toward higher levels of educational attainment, suggesting that there was a response bias.
toward more education and higher socio-economic status in responders than would typically be expected in the general populations. The majority of questionnaires were completed by mothers: 73% in the US sample and 58% in the Dutch sample. Questionnaires were completed by both parents in 10% of the US sample and 29% of the Dutch sample; remaining questionnaires were completed by fathers: 15% in US sample and 11% in the Dutch sample. No information on race/ethnicity of the responder was collected as these variables are not routinely collected in the Netherlands. The survey was completed anonymously, and demographic information was not collected for nonresponders.

**Measures**

Parents were asked to complete a survey questionnaire constructed for the purpose of this study. It included the PARS-III, the Revised Rutter Scale (RRS) (Parker, Yiming, Tan, & Rutter, 2001), and other various items assessing demographics (age of patient with DMD, parental educational status) and disease parameters (e.g., use of steroids).

**Psychosocial Adjustment and Role Skills Scale III (Stein & Jessop, 1990)**

This instrument is a brief parent-completed index of youth psychosocial adjustment. All 28 items use a 4-point interval rating scale: “never or rarely,” “sometimes,” “often,” or “always or almost always.” Of them, 20 items are “reverse scored.” Item responses are assigned 1–4 points on a likert-type scale, and the summation of all item responses results in the total score. Summation of specific items also yields six factor-derived psychosocial subscales: peer relations, dependency, hostility, productivity, anxiety/depression, and withdrawal. Higher scores indicate better adjustment (Stein & Jessop, 1990; Walker et al., 1990). In the original study, by Walker et al. conducted with 450 children with a variety of chronic medical conditions (including asthma, seizure disorders, cystic fibrosis, cerebral palsy, and endocrine disorders) the reliability (coefficient α) of the total summary score was .88 overall, with subscales ranging from .70 to .80. Construct validity of the six subscales was supported by principal component factor analysis and concurrent validity was adequate, as supported by significant correlations in the expected directions with the Child Behavior Checklist (Achenbach & Ruffle, 2000) and the Health Resources Inventory (Gesten, 1976). Because girls were reported to have slightly higher (better) scores on the total scale and four of the subscales (peer relations, dependency, hostility, and productivity), only the results of the males from their study will be used in comparison to our results, which also consists only of male subjects.

Similar to the original Walker et al. (1990) study, we elected to set the cutoff score at −1 SD below the mean of our sample. This was judged to be an adequate and understandable method of identifying males with DMD who are at risk for having adjustment problems as compared to other males with DMD.

**Revised Rutter Scale (Parker et al., 2001)**

This is an 8-item parent-completed measure of emotional distress in children (Parker et al., 2001). The scale has four items derived from the emotional difficulties RRS subscale and four additional items assessing lack of enjoyment, irritability, withdrawal, and poor concentration (Parker et al., 2001). Parents are required to state whether the item “does not apply,” “applies somewhat,” or “certainly applies” (with respective scores of 0, 1, and 2). Higher scores indicate higher levels of global emotional stress in children. Research (Parker et al., 2001) has demonstrated that the RRS has sound psychometric properties, e.g., inter-rater reliability .84.

**Data Analysis**

The various analyses were performed using SPSS PC (version 11.0). Descriptive statistics i.e., mean and SD were initially calculated. We used a structural equation-based confirmatory factor analysis (CFA) using LISREL version 8.30 (Jöreskog and Sörbom, 1999) to determine if the items of the PARS-III loaded on the six domains as predicted. The goodness-of-fit for the factor solution was evaluated by calculating the Comparative Fit Index (CFI) and the standardized root mean square residual (SRMR). To evaluate the goodness-of-fit, we used the combination rules recommended by Hu and Bentler (1999) suggesting a good fit if both the CFI-value is ≥.95 and the SRMR is ≤.09. Internal consistency reliability coefficients (Cronbach’s α) were calculated for the PARS-III total score and six subscales. A coefficient of ≥ .80 was set as the minimum limit for acceptance for the total score, and a coefficient of ≥ .70 was set as the minimum level of acceptance for subscale scores (Sattler, 2001). Convergent validity of the PARS-III questionnaire was assessed by calculating correlation levels (Spearman’s correlation) between the total scores on the PARS-III and the total scores of the RRS. A coefficient of −.60, with a statistical significance at p < .05, was set as the minimum level of acceptance for the total scale scores. T-tests were used to compare the overall score and subscale scores of patients with DMD to total and subscale scores for a male clinical reference group that has been previously reported (Walker et al., 1990), and to compare the overall and subscale scores of participants taking steroid medicine with those...
who were not. Bivariate correlations were computed to analyze the relationship between age as a continuous variable and psychosocial adjustment.

Results
Primary Analysis

Each item of the PARS-III questionnaire had <1.4% missing data. This means that the questionnaire was completed for a valid population number of 282 males with DMD. The results of the confirmatory factor analysis are presented in Table I. Our data proved to have a good fit as CFI was .96 and SRMR was .06. Factor loadings >.40 are presented in Table I. The item-factor correlations, which are also presented in Table I, were estimated with the use of the maximum likelihood factor analyses within the SPSS software program. The factors in our study corresponded closely with the factor structure, that was originally published for the PARS-III, thereby justifying the use of the six previously identified subscales of psychosocial adjustment. The Pearson correlations, corrected for attenuation, for the six factors are reported in Table II. Patterns of subscale intercorrelations provide data for construct validity. The correlations ranged from .18 (p = .002) to .55 (p ≤ .001), indicating significant relationships among the subscales. In Table III, the mean scores, SD and SE for the total PARS-III score and the six subscales are described. Our descriptive statistics suggest that an appropriate cutoff score (mean – 1 SD as suggested by Pless et al., 1994 and Witt et al., 2003) would be 72.3.

The internal consistency of the total scale was good with α at .91. The internal consistency of the subscales was acceptable with subscale α’s ranging from .74 for dependency to .89 for hostility.

Convergent validity of the PARS-III was supported by the negative correlations of the PARS-III with the RRS. The Spearman correlation between RRS scores and PARS-III scores within our group of patients with DMD

Table I. Short Item-description and Results of Confirmatory Factor Analysis: Factor Loadings and in Italics the Estimated Correlations

<table>
<thead>
<tr>
<th>Short description of item</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
<th>F5</th>
<th>F6</th>
</tr>
</thead>
<tbody>
<tr>
<td>01: Spent time with friends</td>
<td>.76</td>
<td>.82</td>
<td>.09</td>
<td>.21</td>
<td>.21</td>
<td>.19</td>
</tr>
<tr>
<td>02: Made friends without difficulty</td>
<td>.80</td>
<td>.86</td>
<td>.20</td>
<td>.19</td>
<td>.27</td>
<td>.21</td>
</tr>
<tr>
<td>03: Joined others of own accord</td>
<td>.81</td>
<td>.87</td>
<td>.21</td>
<td>.20</td>
<td>.21</td>
<td>.25</td>
</tr>
<tr>
<td>04: Had many friends</td>
<td>.77</td>
<td>.83</td>
<td>.20</td>
<td>.19</td>
<td>.27</td>
<td>.25</td>
</tr>
<tr>
<td>05: Wanted help in things</td>
<td>.14</td>
<td>.65</td>
<td>.78</td>
<td>.40</td>
<td>.33</td>
<td>.29</td>
</tr>
<tr>
<td>06: Unable to decide for himself</td>
<td>.13</td>
<td>.43</td>
<td>.47</td>
<td>.28</td>
<td>.26</td>
<td>.28</td>
</tr>
<tr>
<td>07: Asked for help</td>
<td>.17</td>
<td>.74</td>
<td>.87</td>
<td>.42</td>
<td>.48</td>
<td>.30</td>
</tr>
<tr>
<td>08: Asked unnecessary questions</td>
<td>.20</td>
<td>.81</td>
<td>.83</td>
<td>.55</td>
<td>.54</td>
<td>.39</td>
</tr>
<tr>
<td>09: Done things for attention</td>
<td>.21</td>
<td>.50</td>
<td>.73</td>
<td>.75</td>
<td>.41</td>
<td>.41</td>
</tr>
<tr>
<td>10: Flared up if could not have own way</td>
<td>.12</td>
<td>.46</td>
<td>.61</td>
<td>.85</td>
<td>.39</td>
<td>.47</td>
</tr>
<tr>
<td>11: Became upset if others did not agree</td>
<td>.20</td>
<td>.45</td>
<td>.77</td>
<td>.80</td>
<td>.43</td>
<td>.53</td>
</tr>
<tr>
<td>12: Ignored warnings to stop behavior</td>
<td>.23</td>
<td>.50</td>
<td>.90</td>
<td>.95</td>
<td>.48</td>
<td>.48</td>
</tr>
<tr>
<td>13: Told lies</td>
<td>.09</td>
<td>.27</td>
<td>.53</td>
<td>.55</td>
<td>.30</td>
<td>.31</td>
</tr>
<tr>
<td>14: Does not respond to discipline</td>
<td>.17</td>
<td>.44</td>
<td>.77</td>
<td>.80</td>
<td>.45</td>
<td>.41</td>
</tr>
<tr>
<td>15: Stayed with task until finished</td>
<td>.27</td>
<td>.44</td>
<td>.42</td>
<td>.78</td>
<td>.83</td>
<td>.30</td>
</tr>
<tr>
<td>16: Made full use of abilities</td>
<td>.31</td>
<td>.51</td>
<td>.38</td>
<td>.69</td>
<td>.72</td>
<td>.34</td>
</tr>
<tr>
<td>17: Done work without being pushed</td>
<td>.20</td>
<td>.41</td>
<td>.43</td>
<td>.73</td>
<td>.78</td>
<td>.30</td>
</tr>
<tr>
<td>18: Kept on task even when difficult</td>
<td>.24</td>
<td>.50</td>
<td>.48</td>
<td>.87</td>
<td>.95</td>
<td>.34</td>
</tr>
<tr>
<td>19: Complained about problems</td>
<td>.12</td>
<td>.30</td>
<td>.35</td>
<td>.27</td>
<td>.48</td>
<td>.53</td>
</tr>
<tr>
<td>20: Seemed restless</td>
<td>.24</td>
<td>.41</td>
<td>.55</td>
<td>.36</td>
<td>.75</td>
<td>.77</td>
</tr>
<tr>
<td>21: Said people didn’t care about him</td>
<td>.04</td>
<td>.22</td>
<td>.36</td>
<td>.18</td>
<td>.62</td>
<td>.75</td>
</tr>
<tr>
<td>22: Seemed sad</td>
<td>.24</td>
<td>.16</td>
<td>.27</td>
<td>.24</td>
<td>.60</td>
<td>.71</td>
</tr>
<tr>
<td>23: Said he couldn’t do things right</td>
<td>.17</td>
<td>.24</td>
<td>.37</td>
<td>.29</td>
<td>.60</td>
<td>.72</td>
</tr>
<tr>
<td>24: Acted afraid</td>
<td>.32</td>
<td>.39</td>
<td>.34</td>
<td>.27</td>
<td>.60</td>
<td>.66</td>
</tr>
<tr>
<td>25: Stared without doing anything</td>
<td>.20</td>
<td>.18</td>
<td>.23</td>
<td>.19</td>
<td>.25</td>
<td>.57</td>
</tr>
<tr>
<td>26: Appeared listless</td>
<td>.19</td>
<td>.24</td>
<td>.24</td>
<td>.21</td>
<td>.31</td>
<td>.61</td>
</tr>
<tr>
<td>27: Seemed unaware of things</td>
<td>.22</td>
<td>.29</td>
<td>.27</td>
<td>.29</td>
<td>.22</td>
<td>.64</td>
</tr>
<tr>
<td>28: Showed little interest in things</td>
<td>.48</td>
<td>.43</td>
<td>.38</td>
<td>.43</td>
<td>.43</td>
<td>.77</td>
</tr>
</tbody>
</table>

F1, peer relations; F2, dependency; F3, hostility; F4, productivity; F5, anxiety/depression; F6, withdrawal.
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The total PARS-III scores of 161 males in our study using steroids (56%) were compared to 118 nonusers (41%). T-test indicated no significant difference between the two groups ($t = 1.37; p = .17$). Analyses of subscales indicated a small but significant difference ($t = 2.33; p = .02$) for the withdrawal subscale when boys using steroids ($M = 14.6$) were compared to nonusers ($M = 14.0$).

**Exploratory Analyses**

The total PARS-III scores of 161 males in our study using steroids (56%) were compared to 118 nonusers (41%). T-test indicated no significant difference between the two groups ($t = 1.37; p = .17$). Analyses of subscales indicated a small but significant difference ($t = 2.33; p = .02$) for the withdrawal subscale when boys using steroids ($M = 14.6$) were compared to nonusers ($M = 14.0$).

**Discussion**

Our results confirm Hypotheses 1 and 2, indicating that the PARS-III is a reliable and valid measure for screening psychosocial adjustment in the DMD population. Internal consistency reliability was good overall and was somewhat stronger than what was published in the original study, possibly reflecting the increased homogeneity of our sample. Convergent validity was adequate; however, this is to be expected in a broad-based screening measure. There was strong support for good construct validity, as the six factors previously identified by Stein and
to what we assumed in Hypothesis 5, a decrease in the domain of peer relations was an exception. Contrary strategies that occurs over time. 2005) or possibly the development of effective coping in boys with DMD (Cotton, Voudouris & Greenwoud, skills that some have proposed to occur with increased age reflect the improvement in cognitive and problem-solving LeBlanc, Goldsmith & Patel, 2003). These results may been reported in other conditions (Eiser & Jenny, 2007; progresses. However, this is consistent with what has counter-intuitive that boys with DMD are being rated by their parents as better able to decide things for themselves, asking less unnecessary questions, or asking for less help in things when compared to boys with other types of chronic conditions.

This is the first study to compare the psychosocial adjustment of a large sample of patients with DMD to findings reported in males with other chronic illnesses. We were encouraged to see that patients with DMD do not appear to be at significantly greater risk for adjustment problems than boys with other types of chronic conditions, thereby confirming Hypothesis 3. It seems counter intuitive that boys with DMD are rated as less dependent than boys with other medical conditions. However, this finding may reflect the fact that boys with DMD are being rated by their parents as better able to decide things for themselves, asking less unnecessary questions, or asking for less help in things when compared to boys with other types of chronic conditions.

Our study also demonstrated that patient age is an important factor when conceptualizing psychosocial adjustment in males with DMD. In general, there was a trend for overall psychosocial adjustment to be rated higher as age increased, confirming Hypothesis 4. It is difficult to interpret this finding, as the logical assumption would be that more problems should arise as the disease progresses. However, this is consistent with what has been reported in other conditions (Eiser & Jenny, 2007; LeBlanc, Goldsmith & Patel, 2003). These results may reflect the improvement in cognitive and problem-solving skills that some have proposed to occur with increased age in boys with DMD (Cotton, Voudouris & Greenwoud, 2005) or possibly the development of effective coping strategies that occurs over time.

Despite the trend in overall improvement with age, the domain of peer relations was an exception. Contrary to what we assumed in Hypothesis 5, a decrease in functioning in peer relations was related to increased age. Although age is not a direct proxy for disease severity, the most obvious interpretation of this is that there is a decrease in access to social, recreational, and educational/vocational opportunities as physical impairment progresses and health deteriorates. Emotional factors such as anxiety and depression could also potentially contribute to peer problems; our data show a modest but significant relationship between these domains ($r = .29$ between the anxiety/depression and peer relations scores).

Because the PARS-III is not designed to establish psychiatric diagnosis and has not been normed on the normal population, there is the risk that the PARS-III may under-identify psychopathology (Harris et al., 1996). The lack of norms for the general population also does not allow for greater understanding of the clinical relevance and implications of individual PARS-III scores. However, the use of the clinical cutoff that was established in this study (total score <72) will hopefully allow professionals to quickly identify patients who are at risk for having adjustment problems, and who may benefit from more comprehensive evaluations (such as clinical evaluation, pathology-focused rating scales, or neuropsychological testing).

While it is well known that common side effects of corticosteroid treatment include behavioral and emotional problems (Biggar et al., 2006; Dubowitz, 2005), our results are consistent with those of Hinton et al. (2007), who found that steroids were not associated with the behavioral outcome of children in their study. Our results indicated that there was no significant difference in overall psychosocial adjustment between males with DMD in our study who were taking steroids as compared to those who were not. Although our model limits the conclusions that can be drawn from this finding, there was no indication that steroids played a major role in negatively modifying psychosocial adjustment in our sample. In contrast, subscale analyses indicated that participants who were using steroids showed less withdrawal than peers. Our cross-sectional model limits our ability to determine if this finding was possibly indicative of a beneficial causative effect (e.g., participants were less withdrawn because steroids increased mobility and reduced medical complications) or a self-selection bias effect (e.g., males with pre-existing emotional problems or withdrawal are less likely to be treated with steroids).

### Table V. Bivariate Correlations between Scores on the PARS-III and Age

<table>
<thead>
<tr>
<th>Score</th>
<th>Dependency</th>
<th>Hostility</th>
<th>Productivity</th>
<th>Anxiety/depression</th>
<th>Withdrawal</th>
<th>PARS total scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peer relations</td>
<td>-.19***</td>
<td>.24***</td>
<td>.34***</td>
<td>.16**</td>
<td>.06</td>
<td>.15*</td>
</tr>
</tbody>
</table>

**p < .001; **p < .01; *p < .05.**
In general, our study has several strengths including (a) the focus is on males with DMD, which is an under-researched population, (b) the use of an international sample of participants, which enhances the generalizability of our findings, (c) the use of few exclusionary criteria, which can also enhance external validity, and (d) the recruitment of a relatively large sample given the rarity of this illness. However, there are a number of limitations to our study that should be addressed in future research. As previously mentioned, one of these limitations is the use of a cross-sectional methodology. Because our data are cross-sectional, we were limited in our ability to examine causative factors and change over time. In particular, longitudinal studies are necessary to further elucidate the relationship between age, steroid use and various areas of adjustment. Longitudinal models will also allow greater examination of other important topics such as the overall lifetime risk of problems with psychosocial adjustment dysfunction, or the identification of factors that predict positive outcome. Given the fact that poor to moderate correlations between parent and child ratings on different measures have been reported elsewhere (Eiser & Jenney, 2007), another limitation of our study is our sole reliance on parent report. This method of data collection has the potential to be influenced by parental stress and/or emotional maladjustment (Abi Daoud, Dooley & Gordon, 2004), and can also be problematic because some of the findings may reflect shared method variance. A multi-informant perspective is preferred and future cross-validation studies should include both parent and patient self-report whenever possible, as is done in epilepsy for instance (Buck, Smith, Appleton, Baker & Jacoby, 2007).

The trend toward higher educational achievement in our study and the low-response-rate suggests the possibility of a selection bias in the participants of our study, which may have had an impact on the external validity of our results. More specifically, families with higher education levels may have greater access to financial or other resources that may serve to reduce stressors, thereby resulting in our study under-representing psychosocial adjustment in patients from families with less educational opportunities.

There was also a difference in response rates for the Dutch and American samples in our study. The reason for this is not fully understood, and may have been the result of the method by which the parents were contacted or societal/cultural differences. Also, it is unknown to what extent differences between the rates of Dutch and American mothers completing the questionnaires might have had on the results.

In regards to the general trend for improved overall psychosocial functioning as age increases, the possibility of an attrition/mortality bias has been suggested by others (Miller, Tunnecliffe, & Douglas, 1985). More specifically, there is the possibility that young men with DMD who have better psychosocial functioning have a less severe form of the disease, and therefore a longer lifespan. However, given that we only included boys who were 18 years of age or younger, the impact of an attritional bias is less likely.

While this study identified a cutoff for the PARS-III that can be helpful in clinical practice, the development of clinical norms based on a demographically representative sample would be highly useful. Also, further research is needed on repeated administration of the PARS-III, as this might be of value in clinical practice so as to help elucidate the individual developmental psychosocial profile of males with DMD. Repeated administration of the PARS-III might also contribute to monitoring psychosocial outcome in future scientific research on potential treatments for DMD which are currently in progress, like corticosteroid treatment and other clinical trials.

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