Description of and Relationships among Potential Variables Supported for the Diagnosis of Delayed Ejaculation

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Abstract: The lack of empirically based diagnostic criteria for delayed ejaculation (DE) not only undermines confidence in the reported prevalence rates for this sexual dysfunction, but it has also resulted in a lack of validated patient reported outcomes (PROs) for assessing this condition. The current study was designed to describe and evaluate six face-valid variables previously shown to discriminate between men with and without DE for their utility as diagnostic measures for DE. A sample of 1285 men (mean age = 37.8, SD = 12.7) free of erectile problems and premature ejaculation completed an online sexual health survey that included potential questions intended for use in the diagnosis of DE. Questionnaire items included ones reflective of previously proposed diagnostic constructs related to DE: ejaculation timing/latency, ejaculation efficacy/control, and negative effects of DE. Results indicated that five of the six proposed items showed moderate intercorrelations, suggesting that each constituted a distinct (i.e., non-redundant) though relevant criterion related to the diagnosis of DE. Based on the level of interrelatedness, the better items representing each construct were included in commonality analysis to assess their unique contributions to the diagnosis of DE. Perceived lack of ejaculatory efficacy/control contributed the largest portion of the variance to the diagnosis of DE (58%), with bother/distress (an index of the negative effects of DE) contributing the second largest portion (25%), and ejaculation timing/latency contributing only a small portion of the variance (6%) to the diagnosis of DE. The relevance of these findings to developing a patient report outcome (PRO) for diagnosing DE that considers both empirically supported questions/items and an appropriate balance of items regarding the three constructs was discussed.

Keywords: delayed ejaculation; inhibited ejaculation; diagnosis; ejaculatory efficacy/control; ejaculation latency; bother/distress

1. Introduction

Delayed ejaculation (DE), a nosological term that often includes the complete absence of ejaculation, has been defined by APA/DSM-5 [1] as “a marked delay in ejaculation” or “marked infrequency or absence of ejaculation…present in 75% or more of partnered sexual encounters and persistent over at least the last 6 months…and the experience of personal distress”. The ICD-11 [2] offers a similar definition, identifying “male delayed ejaculation” as the “inability to achieve ejaculation or an excessive or increased latency of ejaculation, despite adequate sexual stimulation and the desire to ejaculate…which has occurred episodically or persistently over…at least several months, and is associated with clinically significant distress”.

Although its prevalence among men is uncertain, several recent community and online-based studies estimate that about 7–15% of men suffer from DE [3,4]. In one recent
community sample, the percent of men indicating a strong “desire to ejaculate sooner” during partnered sex was around 7–8% [5], nearly identical to results from the National Health and Social Life Survey (NHSLS) in the USA [6]. Other authors, however, note that in the absence of clear diagnostic criteria, the rate of DE may be underreported and therefore substantially higher [7]. Furthermore, prevalence rates are undoubtedly affected by the definition of the sample, whether it includes men with or without comorbid erectile dysfunction (ED) [8].

Although specific etiological pathways for DE are poorly understood, the dysfunction has been conceptualized as being either lifelong—presumably predispositional or physiological in nature—or acquired/secondary; that is, having various pathophysiological and/or psychological/experiential origins [9]. Yet, the lack of understanding and characterization of DE, the absence of diagnostic criteria and/or assessment tools, and the lack of readily accessible treatment options have resulted in a low public profile for this particular male sexual problem; those suffering from the problem may be less likely to recognize its symptomology, to understand its possible origins, and to consider redress for the problem [3,9].

1.1. Criteria Proposed the Diagnosis of Delayed Ejaculation

Although various professional organizations have suggested definitions for DE, all have been based on expert opinion rather than empirical evidence. In general, proposed diagnostic criteria for DE have paralleled those for premature ejaculation (PE), which has included three constructs: (1) ejaculation that occurs shortly after the initiation of partnered sex; (2) a lack of ability to better modulate/control/delay the timing of ejaculation (a problem of “self-efficacy”); and (3) negative effects (e.g., sexual bother/distress) resulting from the PE [1,9,10]. For DE, parallel constructs have been proposed: (a) ejaculation that occurs only after a long/extended period of stimulation during partnered sex, or not occurring at all; (b) a lack of ability to modulate/control/hasten the timing of ejaculation; and (c) negative effects (e.g., sexual bother/distress) resulting from the DE [1,2,9,11]. While these three constructs have substantial face-validity and have thus garnered hypothetical support for use in the diagnosis of DE, few studies have actually offered empirical support for them [5,12].

1.2. Rationale and Goals

The lack of empirically based diagnostic criteria not only undermines confidence in the reported prevalence rates for DE, but it has also resulted in a lack of validated patient reported outcomes (PROs) specifically focused on the assessment of this dysfunction. While expert opinion and face-validity are important preliminary steps in establishing diagnostic criteria, quantification/validation of the proposed variables through empirical testing is critical for ensuring an accurate DE diagnosis [13].

In one recent study [12], differences in a number of demographic, sexual, and relationship variables were explored in men with and without DE symptomology. Of those variables that differed, six corresponded closely to the three face-valid constructs proposed above for the diagnosis of DE. Furthermore, differences between DE and non-DE men for all six showed highly significant (i.e., reliable) and robust (i.e., strong effect size) effects, supporting them as potential candidates for use in a differential diagnosis for DE.

The current study was designed to further study these six variables in order to evaluate their utility as diagnostic measures for DE. Specifically, we:

1. Generated frequency histograms for each of the six variables to better understand their distribution in men free of comorbid PE and ED (Aim 1);
2. Explored the interrelatedness of these variables (Aim 2);
3. Evaluated the capacity for each of the six variables to contribute to the diagnosis of DE, with the goal of selecting the three best variables to represent each of the three constructs proposed as diagnostic criteria (Aim 3);
4. Determined the unique variance contribution of each of three final variables/items selected as candidates for the diagnosis of DE (Aim 4).

2. Materials and Methods

2.1. Participants

Participants were recruited by voluntary self-selection from July 2019 through February 2020 to complete a survey pertaining to sexual health and behavior. The sample was recruited through two approaches. The first group was recruited from the United States and other English-speaking countries (N = 699) and included men who responded to the research homepage, postings on several reddit.com forums, or any of the unpaid social media (e.g., Facebook) and public announcements/advertisements. The second group was recruited from Hungary and included men who responded to comparable forum posts, unpaid online/public advertisements, or the Hungarian research webpage (N = 3243). A final anonymously coded group (not represented in this study sample) consisted of men attending a major university in Hungary (N = 134) who volunteered to take a pencil-and-paper version of the questionnaire to enable test–retest reliability analysis on specific questionnaire items after 4–6-weeks.

The completion rate for the survey was 81% of those who initially opened it. Among those completing the survey, men who had never had a sexual partner, identified as “asexual” or transgender/non-binary, chose not to ejaculate during partnered sex for whatever reason, or showed inconsistency in responding as determined by embedded “attention checks” in the survey, were excluded, as were men who had never had partnered sex (for partnered sex variables) or who did not masturbate (for masturbation variables). In addition, men with ED or PE were removed from the analysis. The final sample consisted of 1285 men 18+ years of age (mean = 37.8, SD = 12.7; range = 18–85).

2.2. Survey Questionnaire

During the survey development process, a pilot study was conducted with seven focus groups. Two focus groups included men in the United States (N = 10, mean age = 32.4), and five included men from Hungary (N = 79, mean age = 22.7), the latter consisting primarily of university students in several professional and academic disciplines. Group members reviewed the questionnaire items, commented on their relevance and clarity of phrasing, and suggested both wording changes and additional response categories [14]. Focus groups also appraised item face-validity and assessed the time required for survey completion. For Hungarian respondents, the questionnaire was translated to Hungarian by a professional translator and subsequently back-translated to English to ensure preservation of meaning. Because items drawn from standardized assessment instruments embedded in the survey had already been validated in Hungarian, these translated items were used, with minor wording changes to fit the requirements of the present study (e.g., modifying “intercourse” to “partnered sex”).

The first part of the 55-item survey queried about demographic and health characteristics, including the respondent’s age, education, anxiety/depression throughout the previous 6 months, and any chronic medical conditions related to sexual functioning. The second portion examined participants’ sexual histories during the previous 12–24 months, including sexual orientation, self-reported interest in sex, general relationship satisfaction, and sexual relationship satisfaction. This section also evaluated the estimated ejaculation latencies (EL) as well as frequencies of partnered sex, masturbation, and pornography use during masturbation. The third section addressed common sexual dysfunctions in men during partnered sex and masturbation and included relevant items from the International Index of Erectile Function, abridged version (IIEF-5) [15] and the Premature Ejaculation Diagnostic Tool (PEDT) [16], as well as questions aimed at assessing DE (see below).
2.3. Selection of Face-Valid Variables Related to the Constructs for Diagnosing DE

Three constructs related to the diagnosis of DE—as delineated previously—were investigated in this study: (a) ejaculation timing/latency; (b) self-efficacy/control regarding the timing of ejaculation; and (c) negative effects of DE. Moreover, as noted, six face-valid variables/items that closely corresponded to these three constructs had previously demonstrated the ability to discriminate between men with and without DE [12]. Two variables/items were related to each of the three constructs, as described below and presented in Appendix A.

2.3.1. The Construct of Ejaculation Timing/Latency

Two items corresponded to the timing of ejaculation during partnered sex. First, participants were asked about their typical ejaculation latency (EL AVG), assessed using the following ordered categories: 1 = “Less than 1 min,” 2 = “1–2 min,” 3 = “3–5 min,” 4 = “6–10 min,” 5 = “11–15 min,” 6 = “16–20 min,” 7 = “21–25 min,” 8 = “More than 25 min,” 9 = “I seldom or never reach orgasm during sex with my partner.” Second, participants were asked to estimate their typical shortest ELs (in minutes) (EL MIN). For each item, men estimated their EL during partnered sex, with EL defined as the interval from the time that penile stimulation began (usually but not always penetration), with the goal of moving toward ejaculation, to the time of ejaculation. For these variables, respondents indicating ELs of 3 min or less were removed from the analysis, as such ELs overlapped with men reporting premature ejaculation (PE). Both EL AVG and EL MIN were also assessed for masturbation.

2.3.2. The Construct of Self-Efficacy/Control Regarding the Timing of Ejaculation

Two items corresponded to the idea that men are able to control or modulate the timing of ejaculation and thus are able to achieve a (more) desired outcome by ejaculating sooner. First, participants were asked “During sex with your partner, do you ever have difficulty reaching orgasm/ejaculation” (DIFF EJAC), with response options ranging from 1 = “almost never” to 5 = “almost always.” Second, participants were asked to estimate the percent of time they reached ejaculation/orgasm during partnered sex (% EPISODES), with options provided on an analog scale ranging in intervals of 10 from “0%” to “100%.” These same two variables were also assessed for masturbation.

2.3.3. The Construct of Negative Consequences of DE

Two items corresponded to the construct of negative consequences of DE. First, participants reported the extent to which they experienced frustration, bother, upset, or guilt during partnered sex if they had difficulty reaching orgasm during partnered sex (BOTHER/DISTRESS). Responses ranged from 1 = “almost never” to 5 = “almost always.” Second, participants rated their (lack of) orgasmic pleasure/satisfaction (PLEASURE/SATISF) during partnered sex, with response options ranging from 1 = “not satisfying” to 5 = “very satisfying.” These same two variables were also assessed for masturbation.

2.4. Control Covariates

In order to ensure that men in the study did not exhibit comorbid ejaculatory disorders such as PE, men with “probable” or “definite” PE, as determined by the PEDT, were removed from the sample. In addition, to ensure that men with DE did not also suffer from comorbid ED, men having moderately severe to severe ED, as determined by the IIEF-5, were removed from the sample.

2.4.1. Assessment of Erectile Function

ED during partnered sex was assessed using four IIEF-5 items related specifically to erection [15] (one item focusing on satisfaction during intercourse was not included). Consistent with the scoring rubric for the IIEF-5, for the four selected items, lower scores indicated greater erectile dysfunction. Men scoring in the range of 4 to 9—indicating
moderately severe to severe ED—were removed from the analysis. Internal reliability for the four items was 0.89, with test–retest reliability of 0.86.

2.4.2. Assessment of Premature Ejaculation

PE during partnered sex was assessed using three of the five items from the PEDT [16] focusing on ejaculatory control, the construct most central to characterizing PE [17,18]. Two items related to “bother/distress” were not included as they represent consequences of PE. Consistent with the overall diagnostic categories for the PEDT, for the included items (scaled 1–5, with higher scores representing greater probability of PE), scores of 13–15 represented “definite PE,” 9–12 represented “probable PE,” and ≤8 represented “no PE.” Those with either “probable” or “definite” PE were removed from the sample. Internal reliability for these three items ranged from 0.80 to 0.85 depending on the sexual orientation of the sample, and test–retest reliability was 0.85.

2.5. Procedure

Ethics approval was obtained from the Institutional Review Boards (IRB) at the authors’ institutions in both the United States and Hungary. The online distribution of the survey and collection of data followed best practices, including approximately 20 min (or less) for survey completion, guaranteed anonymity, safeguards to prevent multiple submissions, embedded attention checks, reporting of internal consistency for standardized assessment scales for the study sample, and offering no incentives for participation [19–23]. Informed consent was obtained by participants’ checking boxes attesting (a) to their current age being ≥18 years, and (b) to their informed consent before accessing the questionnaire. Respondents could voluntarily end participation at any time by closing the webpage.

2.6. Analytical Strategy

In a preliminary cleaning of the data, several differences on demographic variables were noted regarding national origin (origin-of-data), but because differences were generally unrelated to the proposed face-valid diagnostic variables in this analysis, this measure was not investigated further. For Aim 1, descriptive statistics and distribution patterns of the six face-valid variables considered for the DE diagnosis were generated. For Aim 2, Spearman correlations among the proposed diagnostic variables were generated for both partnered sex and masturbation. For Aim 3, commonality analysis [24] was run using the three most promising diagnostic variables to determine their unique contributions to the DE diagnostic criteria, with the common variance for pairs of variables also determined. This procedure involved regressing unique pairs of variables on the third variable for all possible combinations of predictor and outcome variables, that is, each variable served as both a predictor variable in combination with another predictor variable, and as an outcome variable. This procedure generated three separate multiple linear regressions. Analyses were carried out with SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0, Armonk, NY, USA) and R (version 4.2.1) [25] in the RStudio environment, version 2022.7.1.554 [26].

3. Results

3.1. Description of the Sample and Distribution of Proposed Diagnostic Variables (Aim 1)

Description of demographic, sexual, and relationship variables, including the proposed variables for DE diagnosis, is provided in Tables 1 and 2. Frequency distributions for the proposed six diagnostic variables are also illustrated in Figure 1a–f. Figure 1b shows the typical positively skewed distribution of EL MIN, when EL is assessed in minutes [27], and Figure 1a,c–f show distributions for the other five variables, ranging in skew from low (EL AVG, BOTHER/DISTRESS), to moderate (DE DIFF, PLEASURE/SATISF), to high (% EPISODES).
Table 1. Demographic characteristics of the study sample (n = 1285).

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Mean (SD) or Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Age</td>
<td>37.77 (12.65)</td>
</tr>
<tr>
<td>Level of Education</td>
<td>3 (IQR: 1–4)</td>
</tr>
<tr>
<td>Medical Issues (% Yes)</td>
<td>227 (17.7%)</td>
</tr>
<tr>
<td>Anxiety/Depression (% Yes)</td>
<td>247 (19.2%)</td>
</tr>
<tr>
<td>Interest in Sex (1–5, high)</td>
<td>4.23 (0.8)</td>
</tr>
<tr>
<td>Frequency of Partnered Sex (1–10, high)</td>
<td>6.26 (1.64)</td>
</tr>
<tr>
<td>Frequency of Masturbation (1–11, high)</td>
<td>5.65 (2.25)</td>
</tr>
<tr>
<td>Relationship Satisfaction (1–5, high)</td>
<td>4.0 (0.97)</td>
</tr>
<tr>
<td>Sexual Satisfaction (1–5, high)</td>
<td>3.05 (1.72)</td>
</tr>
<tr>
<td>Sexual Orientation (% Straight)</td>
<td>1108 (86.23%)</td>
</tr>
<tr>
<td>(% Bisexual)</td>
<td>22 (1.71%)</td>
</tr>
<tr>
<td>(% Gay)</td>
<td>155 (12.06%)</td>
</tr>
</tbody>
</table>

1 Level of education is presented as median (IQR).

Table 2. Proposed face-valid items for use as diagnostic measures for delayed ejaculation.

<table>
<thead>
<tr>
<th>Variable 1</th>
<th>Construct</th>
<th>Effect Size 2</th>
<th>Mean (SD)</th>
<th>Median (IQR)</th>
<th>Min/Max</th>
<th>Kurtosis</th>
<th>Skew</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL AVG</td>
<td>Ejaculatory timing</td>
<td>0.081</td>
<td>5.88 (1.5)</td>
<td>6 (5–7)</td>
<td>3–9</td>
<td>−0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>EL MIN</td>
<td>Ejaculatory timing</td>
<td>0.071</td>
<td>10.01 (6.7)</td>
<td>8 (5–12)</td>
<td>4–40</td>
<td>2.9</td>
<td>1.7</td>
</tr>
<tr>
<td>DIFF EJAC</td>
<td>Efficacy/control</td>
<td>0.201</td>
<td>89.4 (10.7)</td>
<td>100 (90–100)</td>
<td>10–100</td>
<td>7.2</td>
<td>−2.5</td>
</tr>
<tr>
<td>% EPISODES</td>
<td>Efficacy/control</td>
<td>NA</td>
<td>1.92 (1.2)</td>
<td>1 (1–3)</td>
<td>1–5</td>
<td>0.1</td>
<td>1.1</td>
</tr>
<tr>
<td>BOTHER/DISTRESS</td>
<td>Negative effects DE</td>
<td>0.114</td>
<td>2.74 (1.7)</td>
<td>2 (1–4)</td>
<td>1–5</td>
<td>−1.2</td>
<td>0.5</td>
</tr>
<tr>
<td>PLEASURE/SATISF</td>
<td>Negative effects DE</td>
<td>0.071</td>
<td>4.37 (0.8)</td>
<td>5 (4–5)</td>
<td>1–5</td>
<td>1.1</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Notes: 1 See text for description of variables. 2 Effect sizes refer to differences between DE and non-DE men as found previously [12]. Interpretation of effect size (η²) is as follows: 0.01 = small, 0.06 = medium, 0.14 = large. NA = Not Applicable.

3.2. Relationship among Diagnostic Variables (Aim 2)

Spearman correlations were generated to describe relationships among the proposed diagnostic variables during both partnered sex and masturbation (Table 3). Two patterns among these correlations are noteworthy. First, variables tapping into the same construct would presumably be fairly high, and this was the case for two of the constructs. Specifically, for partnered sex, the correlation between EL AVG and EL MIN (construct = ejaculation timing/latency) was 0.58; and the correlation between DIFF EJAC and % EPISODES (construct = ejaculatory efficacy/control) was −0.46. However, the correlation between (lack of) PLEASURE/SATISF and BOTHER/DISTRESS (construct = negative effects of DE) was only −0.21, suggesting that these two measures were likely tapping into related though different constructs.

Table 3. Spearman correlations among proposed face-valid measures for DE diagnostic criteria. Left-hand correlation in each cell represents partnered sex; right-hand correlation represents masturbation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>EL AVG</th>
<th>EL MIN</th>
<th>DIFF EJAC</th>
<th>% EPISODES</th>
<th>BOTHER/DISTRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL AVG</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EL MIN</td>
<td>0.583 **/0.689 **</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIFF EJAC</td>
<td>0.197 **/0.101 **</td>
<td>0.202 **/0.081 **</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% EPISODES</td>
<td>−0.157 **/−0.104 **</td>
<td>−0.163 **/−0.06 *</td>
<td>−0.459 **/−0.332 **</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>BOTHER/DISTRESS</td>
<td>0.067 */0.054 *</td>
<td>0.091 */0.034</td>
<td>0.439 **/0.362 **</td>
<td>−0.34 **/−0.266 **</td>
<td>X</td>
</tr>
<tr>
<td>PLEASURE/SATISF</td>
<td>−0.039/0.01</td>
<td>−0.106 */0.028</td>
<td>−0.294 **/−0.237 **</td>
<td>−0.292 */0.204 **</td>
<td>−0.21 **/−0.184 **</td>
</tr>
</tbody>
</table>

* p < 0.05; ** p < 0.01.

Second, with the exception of the correlation between EL AVG and EL MIN, all correlations between measures during partnered sex were stronger than correlations during masturbation. In fact, the median correlation for masturbation measures was 66% of the
value of that for partnered sex; that is, the explained variance between variables assessed during masturbation was only about 44% (based on $r^2$ values) of that assessed during partnered sex.

![Figure 1. (a–f) Distributions of six proposed face-valid items for use as diagnostic measures for DE.](image)

### 3.3. Variable Selection for Commonality Analysis (Aim 3)

From the six variables under consideration for diagnosing DE, we selected the stronger of the two variables representing each of the three constructs so as to assess the unique contribution of each variable/construct to the DE diagnosis. We defined “stronger” as the variable representing the construct that showed the stronger correlations (explained variance) with measures representing each of the other two constructs.

For EL AVG and EL MIN (both representing the construct of ejaculation timing), EL MIN showed slightly though consistently stronger correlations with variables representing each of the other two constructs (ejaculatory efficacy/control and negative consequences of DE) (Table 3). We therefore selected EL MIN for commonality analysis.

For (lack of) PLEASURE/SATISF and BOTHER/DISTRESS (both presumably representing the construct of negative consequences of DE), BOTHER/DISTRESS showed sub-
substantially stronger correlations with measures from the other two constructs (ejaculation timing and ejaculatory control/efficacy) (Table 3). We therefore selected BOTHER/DISTRESS as the second variable for commonality analysis.

For DIFF EJAC and % EPISODES (both representing ejaculatory efficacy/control), both correlated about equally with the construct of ejaculation timing, but because DIFF EJAC correlated slightly more strongly with BOTHER/DISTRESS (Table 3), we chose DIFF EJAC as the third variable for commonality analysis.

### 3.4. Determining Unique and Common Variances Contributing to a DE Diagnosis (Aim 4)

In order to determine the relative importance of the putative DE diagnostic criteria (EL MIN, DIFF EJAC, BOTHER/DISTRESS), commonality analyses involving three linear regression models using the R package “yhat” [28] were performed. For each model, both unique and common variances were generated to describe the individual contribution of each predictor to the explained variance in the outcome [29]. The goal was to determine the unique and relative contribution of each of the three variables to the DE diagnosis.

In the first regression model (Table 4), EL MIN and BOTHER/DISTRESS were used to predict DIFF EJAC. The overall $R^2$ for the regression model was 0.209, indicating that nearly 21% of the variation in DIFF EJAC was explained by the two predictors. BOTHER/DISTRESS provided the stronger unique contribution (unique $r^2 = 0.15$), accounting for 73.57% of the model utility. EL MIN accounted for 17.67% of the model utility (unique $r^2 = 0.03$). Common/shared variance between the predictors represented the smallest contribution (common $r^2 = 0.018$), accounting for only about 8.76% of the model fit.

Table 4. Commonality analyses for proposed ejaculation parameters ($n = 1285$).

<table>
<thead>
<tr>
<th>Sources of Variation in DIFF EJAC</th>
<th>Commonality Coefficient</th>
<th>Model Contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL MIN</td>
<td>0.037</td>
<td>17.67%</td>
</tr>
<tr>
<td>BOTHER/DISTRESS</td>
<td>0.154</td>
<td>73.57%</td>
</tr>
<tr>
<td>Common/Shared Variance</td>
<td>0.018</td>
<td>8.76%</td>
</tr>
<tr>
<td>Multiple $R^2 = 0.209$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources of Variation in EL MIN</th>
<th>Commonality Coefficient</th>
<th>Model Contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFF EJAC</td>
<td>0.0443</td>
<td>79.81%</td>
</tr>
<tr>
<td>BOTHER/DISTRESS</td>
<td>0.0001</td>
<td>0.14%</td>
</tr>
<tr>
<td>Common/Shared Variance</td>
<td>0.0111</td>
<td>20.05%</td>
</tr>
<tr>
<td>Multiple $R^2 = 0.0555$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sources of Variation in BOTHER/DISTRESS</th>
<th>Commonality Coefficient</th>
<th>Model Contribution (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIFF EJAC</td>
<td>0.1616</td>
<td>93.51%</td>
</tr>
<tr>
<td>EL MIN</td>
<td>0.0001</td>
<td>0.04%</td>
</tr>
<tr>
<td>Common/Shared Variance</td>
<td>0.0111</td>
<td>6.45%</td>
</tr>
<tr>
<td>Multiple $R^2 = 0.1728$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The second regression (Table 4) considered the effects of DIFF EJAC and BOTHER/DISTRESS on EL MIN. The multiple $R^2$ value was much smaller in this model (5.55%), suggesting that variation in EL was only modestly predicted with these two variables. In this regression, DIFF EJAC provided the largest unique effect (unique $r^2 = 0.044$) and accounted for 79.81% of the model utility. Shared/common variance between BOTHER/DISTRESS and DIFF EJAC represented the second largest effect, accounting for 20.05% of the model fit (common $r^2 = 0.011$) and suggesting considerable overlap between these two predictors. BOTHER/DISTRESS provided a negligible unique contribution to the model (unique $r^2 = 0.0001$), accounting for <1% of the model utility. This small commonality value was further supported by the adjusted regression coefficient for BOTHER/DISTRESS ($\beta = 0.04$,
indicating that this variable provided no additional information after accounting for the effect of DIFF EJAC on EL MIN.

For the third regression (Table 4), DIFF EJAC and EL MIN were used to predict BOTHER/DISTRESS. The full model accounted for roughly 17.3% of the variation in BOTHER/DISTRESS (multiple $R^2 = 0.1728$). EL MIN was not a significant predictor in the regression ($\beta = 0.002, p = 0.745$), and thus its unique commonality coefficient was similarly negligible (unique $r^2 = 0.0001$), accounting for only 0.04% of the model utility. The unique effect of DIFF EJAC was particularly important in this regression model (unique $r^2 = 0.1616$), comprising nearly 94% of the model utility. The remaining 6.45% of the model fit was attributable to the shared/common variance between EL MIN and DIFF EJAC (common $r^2 = 0.111$).

Assuming a closed system in which no variables other than the three under consideration were contributing to a diagnosis of PE, by viewing all three regression analyses together, it was possible to estimate the relative importance of each of the three variables—EL MIN, DIFF EJAC, and BOTHER/DISTRESS—to the diagnosis of DE. Adding the unique contribution (percentages) of each variable across the three regressions and dividing by the overall percentage (300% for the three analyses) yields the average partition of $R^2$ attributable to each variable. Specifically, DIFF EJAC uniquely contributed 57.9% to the DE diagnosis; BOTHER/DISTRESS uniquely contributed 24.9% to the DE diagnosis; and EL MIN uniquely contributed 6.2% to the DE diagnosis; The remainder of the contribution—approximately 11%—was derived from the common (or shared) variances among the three variables.

4. Discussion

This analysis explored in detail six variables/items having the potential to serve as diagnostic criteria for DE. Each variable under consideration was described in the sample by descriptive statistics and its distribution characteristics. The interrelatedness of these six variables during partnered sex and masturbation was also explored and, based on these correlations, variables showing the greatest interrelatedness across constructs were selected for commonality analysis in order to assess their unique contributions to a DE diagnosis. To our knowledge, no other studies have explored potential diagnostic variables for DE in such depth.

4.1. Description and Distribution Characteristics of Proposed Diagnostic Variables

The distribution of the six study variables showed robust variance, including participant responses from every possible option provided. These distributions also ranged in skew. Multiple studies have previously demonstrated a positive skew for measures of ejaculation latency [27,30]. In our analysis, estimated minimum median EL for the overall sample was 8 min—lying toward the upper end of ranges reported in several large-scale population-based studies [27,30]—while the estimated average EL was higher, falling in the 11–15 min range. Because men with probable and definite PE (>20% of the sample) were removed from our analyses, our averages were expectedly higher than those reported in population studies. Beyond EL variables, the other four variables under consideration also showed a range of skews, from low to high. Community samples that include both men with and without a sexual dysfunction (such as DE) are naturally prone to showing some degree of skew. That is, the responses of those men within the sample having no dysfunction (the large majority) typically cluster around one or two response categories, whereas the smaller proportion of men experiencing the dysfunction typically show graded deviations from the predominant response categories selected by men without sexual impairment. This pattern—demonstrated by several of our variables—is also characteristic of such measures as the IIEF and PEDT in samples involving both men with and without the sexual dysfunction being assessed [15,16].
4.2. Interrelatedness of Proposed Diagnostic Variables

Correlations among measures were typically higher for variables tapping into the same construct compared with those tapping into different constructs. Across constructs, correlations among measures ranged from as low as 0.01 to as high as 0.44, with correlations during partnered sex showing nearly 2.5 times the explained covariance as those during masturbation, a finding consistent with the idea that dysfunctional symptomology tends to be greatly attenuated during masturbation vs. partnered sex [31,32].

Regarding specific measures, during partnered sex, EL measures typically showed the weakest correlations with the other constructs. Negative-consequence measures diverged, with bother/distress showing overall moderate correlations with the other two constructs while pleasure/satisfaction generally showed weaker correlations. In addition, self-efficacy/control measures showed the strongest correlations with the other two constructs. To place these findings into perspective, correlations among construct measures would ideally be moderate, as such correlations would provide evidence that each measure constitutes a distinct (i.e., non-redundant) though relevant criterion related to the diagnosis of the dysfunction [13,33].

How does the interrelatedness among the criteria for DE compare with that of another ejaculatory dysfunction, namely premature ejaculation (PE)? Intercorrelations among the PE-diagnostic criteria of EL, ejaculatory control, and bother/distress have long been recognized, both in samples of men having a wide range of ELs, and in samples of men specifically suffering from PE [9,16,17,34–37]. Such correlations typically fall in the moderate range (e.g., ±0.25–0.45). As noted above, for men with DE, the range of the correlations among constructs was substantially greater, from 0.01 to 0.44. Compared with PE men, the link between distress and (lack of) self-efficacy/control was stronger in DE men, but the links between EL and either efficacy/control or bother/distress were considerably weaker. In other words, bother/distress was related about equally to lack of adequate efficacy/control in both PE and DE men, but in contrast, bother/distress was more strongly related to ejaculatory timing in PE men than DE men.

4.3. Selecting the Best Variables for Diagnosing DE and the Unique Contribution of Each

Commonality analysis [24] enables calculation of the unique and common variance contributions of each of the three constructs (as represented by specific items) to the diagnosis of DE. Of the six variables under consideration, we selected the best three—with a single item representing each of the face-valid constructs—for inclusion in the commonality analysis. Variable selection was based on the interrelatedness of each variable with the other two constructs. Regarding the negative consequences of DE, (lack of) orgasmic pleasure/satisfaction performed poorly relative to bother/distress, leading us to retain the latter for commonality analysis. As with studies on PE [9,38,39], we found that (sexual) satisfaction/pleasure was predicted by too many variables other than dysfunctional status, compared with (sexual) bother/distress which was more strongly predicted by the man’s DE status. Measures of ejaculation timing/latency—EL AVG and EL MIN—were nearly identical in their predictive capacity, although due to its slight superiority, EL MIN was retained for inclusion in commonality analysis. We surmise that men might find it easier to estimate their typical lowest ELs (presumably fewer in number) compared with having to mentally calculate an average for the sum total of all their ELs over the past 1–2 years. For measures of efficacy/control, DE DIFF performed slightly better than % EPISODES, so we retained the former for inclusion in the commonality analysis.

When the unique and common variances of the three finalized variables were estimated through commonality analysis, by far the strongest unique contributor to the DE diagnosis was DE DIFF—the measure of efficacy/control—which accounted for 58% of the diagnostic variance. Although such percentages offer only approximations, this high percentage mirrors the strong contribution that efficacy/control contributes to the diagnosis of PE (55%) [40], thereby reiterating the central role for this construct in the diagnosis of both ejaculatory disorders, PE and DE [17,18]. However, in contrast with efficacy/control,
the current study suggests that BOTHER/DISTRESS (a negative consequence variable) contributes much more to the diagnosis of DE (25%) than to the diagnosis of PE (4%) [40], and that EL contributes much less to the diagnosis of DE (6%) than to the diagnosis of PE (27%). Thus, PE and DE diverge substantially in the relative contributions of EL and bother/distress to their respective diagnoses. Specifically, for men with suspected DE, after knowing about their lack of efficacy/control, knowing about their level of distress is more helpful for an accurate diagnosis than knowing about their EL. However, for men with suspected PE, after knowing about their lack of efficacy/control, knowing about their short EL is more helpful for a diagnosis than knowing about their level of bother/distress. At first glance, the low utility of EL for the diagnosis of DE may seem somewhat surprising, but several studies have noted a positivity bias toward having longer ejaculation latencies within the general population of men; for example, an inordinately high percentage of men report that they would like to last longer during partnered sex [6], and men consistently report an “ideal” EL that is longer than their self-reported “actual” ELs [41], a phenomenon likely driven in part by a cultural value placed on “sexual stamina” [42].

4.4. Constructing a Diagnostic Procedure for Assessing DE

A differential diagnosis attempts to accurately assign men to a sexually functional or dysfunctional category so as to identify a group for whom treatment may be advised. Such diagnoses are also important to establishing accurate prevalence rates for the dysfunction [13]. To date, no PROs focus specifically on the assessment of DE, and broader PROs assessing general sexual health in men lack specificity in the assessment of DE. For example, the Male Sexual Health Questionnaire (MSHQ [43]) devotes only 2 of 16 items to assessing DE, with no separate subscale generated for this dysfunction. The findings of this study identify a number of questions that have demonstrated utility in implementing a DE diagnosis. The first asks about the man’s difficulty reaching ejaculation/orgasm during partnered sex, the second about the man’s typical minimum ejaculation latencies during partnered sex, and the third about the man’s level of bother/distress due to the problem. As construct evaluation often benefits from multiple-item assessment—as has been demonstrated with patient reported outcomes [PROs] used to assess ED and PE [15,16]—two other items could serve as supplementary questions, one asking about the man’s average EL, the second about the estimated % of the time the man typically reaches orgasm/ejaculation during partnered sex. Both items performed well in our analyses.

Our results provide an initial step in the pursuit of developing a reliable and valid PRO for the diagnosis of DE, identifying three primary items and two supplementary items that have demonstrated utility. We continue to develop and test other items/questions related to the three diagnostic constructs for DE, our ultimate goal being to construct an internally reliable PRO that not only has demonstrated capacity to discriminate between men with and without DE, but also represents an appropriate balance regarding the contribution of each construct to the diagnosis of DE [13,33].

4.5. Limitations

Several limitations need to be noted. For one, although we followed best practices for online survey distribution and collection of data [19–23], research strategies that rely heavily on public and social media for recruitment are subject to biases in education, class, social media access, and other factors. Second, we did not use clocked ELs in this study, a procedure that would have been impractical for a study of this scope and sample size. However, we note that three large-scale studies have concluded that estimated and clocked ELs can be used interchangeably [39,43–45] and, as implied by another analysis, clocked ELs may in some instances be a less reliable/valid measure of EL, given the well-known principle that “the observer always influences what is being observed” [46]. Third, although we ensured that our sample did not include men with comorbid dysfunctions such as ED and PE, this study did not explore differences between men with different etiologies of DE;
for example, lifelong vs. acquired DE, an issue that awaits future analyses. Finally, we did not assess the partner’s response to the man’s problem with reaching ejaculation/orgasm.

5. Conclusions

Five of six face-valid questions/items having the ability to discriminate between men with and without delayed ejaculation show strong potential for use in the diagnosis of this sexual problem. These five items represent three constructs previously proposed as diagnostic criteria for DE, which include a measure of ejaculation timing/latency, a measure of ejaculatory efficacy/control, and a measure of the negative effects of the ejaculatory impairment. Application of commonality analysis demonstrated that the perceived lack of ejaculatory efficacy/control contributed the largest portion of the variance to the diagnosis of DE, with bother/distress (an index of the negative effects of the ejaculatory impairment) contributing the second largest portion, and ejaculation timing/latency contributing only a small portion of the variance in the diagnosis of DE. Overall, this information will be useful in establishing a validated PRO for the assessment of DE.


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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Boards of Valparaiso University USA (#19-001, 9 October 2019) and ELTE Eötvös Loránd University HUNGARY #(2018/180).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: Output data files are available upon reasonable request to the corresponding author.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. Description of variables and response options in consideration for diagnostic criteria for DE.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Description in Survey Questionnaire</th>
<th>Response Categories</th>
</tr>
</thead>
</table>
| Typical Ejaculatory Latency   | If you have partnered sex, about how long does it take for you, on average, to reach orgasm, from the time that you begin penile stimulation (i.e., when you initially start trying to move toward orgasm/ejaculation)? | 1 = Less than 1 min  
2 = 1–2 min  
3 = 3–5 min  
4 = 6–10 min  
5 = 11–15 min  
6 = 16–20 min  
7 = 21–25 min  
8 = More than 25 min  
9 = I have partnered sex but can seldom reach orgasm  
10 = I have partnered sex but choose not to ejaculate |
<p>| (“EL AVG”)                    |                                                                                                     |                                                                                     |
| Shortest Ejaculatory Latency  | If you reach orgasm during partnered sex, estimate the typical shortest time in minutes for ejaculation, from the time you begin penile stimulation that moves you toward orgasm. | Self-reported minutes                                                               |
| (“EL MIN”)                    |                                                                                                     |                                                                                     |</p>
<table>
<thead>
<tr>
<th>Variable Name.</th>
<th>Description in Survey Questionnaire</th>
<th>Response Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty Reaching Ejaculation/Orgasm (&quot;DIFF EJAC&quot;)</td>
<td>During sex with your partner, do you ever have difficulty reaching ejaculation/orgasm?</td>
<td>0 = I chose not to ejaculate due to personal preferences/beliefs 1 = almost never 5 = almost always</td>
</tr>
<tr>
<td>Frequency of Partnered Sex Ending in Orgasm (&quot;% EPISODES&quot;)</td>
<td>Estimate how often sex with a partner typically ends in (or ended in) orgasm for you. If you have not had any sexual activities with your partner, or if you choose not to reach orgasm, select NA (not applicable).</td>
<td>0 = 0% 1 = 10% 2 = 20% 3 = 30% 4 = 40% 5 = 50% 6 = 60% 7 = 70% 8 = 80% 9 = 90% 10 = 100%</td>
</tr>
<tr>
<td>Sexual Dysfunction related (&quot;BOTHER/DISTRESS&quot;)</td>
<td>When you have (or have had) sex with your partner, if you have any difficulties with sex, such as finding it very difficult to reach orgasm, does (or did) this bother, upset, or frustrate you, or make you feel guilty?</td>
<td>0 = N/A: I nearly always reach orgasm with my partner, so this is not a problem 1 = Almost never 5 = Almost always</td>
</tr>
<tr>
<td>Orgasmic Pleasure (&quot;PLEASURE/SATISF&quot;)</td>
<td>When you have (or have had) sex with a partner, how pleasurable or satisfying would you rate your typical orgasm?</td>
<td>0 = N/A: I generally choose not to ejaculate during partnered sex 1 = Not satisfying 5 = Very satisfying</td>
</tr>
</tbody>
</table>

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