Genital Self-Image, Sexual Function, and Quality of Life Among Individuals with Vulvar and Non-Vulvar Inflammatory Dermatoses

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Abstract
Vulvar inflammatory dermatoses (VID; e.g., lichen sclerosus, lichen planus, vulvar dermatitis) can significantly impact sexual function. Both vulvar and non-vulvar inflammatory dermatoses (NVID; i.e., skin conditions not impacting vulvar skin, such as non-genital psoriasis and eczema/dermatitis) have yet to be fully characterized with regard to impact on genital self-image. A 20-min web-based survey was distributed September–November 2020 through social media ads, support groups, and online research recruitment services. Individuals in the USA over age 18 who were assigned female at birth and self-reported having been diagnosed with an inflammatory dermatosis were eligible. The primary outcome was the Female Genital Self-Image Scale (FGSIS). Secondary outcomes included the Female Sexual Function Index (FSFI), the Skindex-16 (a skin-related quality of life measure), the PROMIS Global-10 (assessing global physical/mental health), and sexual behavior histories. Participants (n = 348) reported mean age of 43.1 ± 15.5 (range = 19–81). Nearly one-third (n = 101; 29.0%) reported VID, 173 (50%) had NVID, and 74 (21%) experienced both vulvar and non-vulvar symptoms; they were analyzed as part of the VID group. The mean FGSIS score among participants with VID was 16.9 ± 4.1 and was significantly ($p < .01$) lower than that of participants with NVID (M = 21.2 ± 4.3), indicating lower genital self-image. Mental health (as measured by PROMIS-Global 10) was also impaired in VID. Rates of sexual dysfunction were high in both groups (> 60%). Findings suggest that in VID, lower genital self-image is correlated with poorer sexual function, quality of life, and global physical and mental health. Additional recommendations for VID management are proposed.

Keywords Genital self-image · Sexual function · Vulva · Genital health · Dermatology

Introduction
Vulvar inflammatory skin conditions represent a significant morbidity burden for affected people and can greatly impact the sexual lives of patients and their partners. Vulvar lichen sclerosus, lichen planus, and lichen simplex chronicus are all examples of such vulvar inflammatory dermatoses (VID), and they can manifest as itching, pain, discoloration, skin texture changes, and greater vulnerability to tearing during solo and partnered sexual activity; more severe complications include increased risk of vulvar cancer as well as permanent anatomical alteration (Barchino-Ortiz et al., 2012; Guerrero & Venkatesan, 2015; Thorstensen & Birenbaum, 2012). Hidradenitis suppurativa, an inflammatory condition leading to painful abscess formation characteristically in the groin and underarms, has also been noted to severely impact sexual health and quality of life (Janse et al., 2017). Additionally, general skin conditions such as psoriasis and dermatitis can affect the vulva exclusively or in addition to other body parts (Meeuwis et al., 2010). Though etiology and pathophysiology of these dermatologic conditions differ, all can result in vulvar symptoms with a significant impact on sexual function and well-being.

VID are often misdiagnosed, leading to delays in treatment and increased burden of disease (Thorstensen & Birenbaum,
Proposed barriers to prompt treatment and management include clinician inexperience, patient embarrassment, and the "orphan" nature of these conditions, which tend to be caught between gynecology and dermatology (Guerrero & Venkatesan, 2015). When the diagnosis is eventually made, VID typically require chronic management and lifestyle change, with many patients struggling for years to find relief (Guerrero & Venkatesan, 2015). The prevalence of such conditions is poorly understood, as population-based studies are lacking (Guerrero & Venkatesan, 2015; Thorstensen & Birenbaum, 2012).

Lichen sclerosus was present in 2% of women presenting at a general gynecology clinic (Goldstein et al., 2005) and 27% at a vulvar specialty clinic (Sullivan et al., 1999). Diagnoses of lichen planus and lichen simplex chronicus in vulvar specialty clinics represent 2–4% (Michelli et al., 2000; Sullivan et al., 1999) and 10% (Sullivan et al., 1999) of new consults, respectively. Better epidemiologic estimates exist for hidradenitis suppurativa, occurring in 0.1% of the general US population and more commonly in women (Garg et al., 2017). Up to half of patients with psoriasis may experience genital involvement and can occasionally do so even in the absence of non-genital disease (Meeuwis et al., 2010).

Vulvar Inflammatory Disease, Quality of Life, and Sexual Function

Research has demonstrated a significant impact of VID on quality of life and sexual function (Alavi et al., 2018; Cheng et al., 2017; Haefner et al., 2014; Janse et al., 2017; Konuk et al., 2007; Lansdorp et al., 2013; Lundqvist et al., 2006; Machin et al., 2010; Nieuwenhof et al., 2010; Sargeant & O’Callaghan, 2007; Thareja et al., 2016). VID are recognized as a significant source of sexual pain (Goldstein & Goldstein, 2020), with more than half of lichen sclerosus patients reporting dyspareunia as a symptom (Corazza et al., 2020). One case-controlled study comparing women with lichen sclerosus to healthy and *Candida*-infected controls found women with lichen sclerosus reported significantly less satisfying and less frequent sexual activity than either control group; nearly a quarter of women with lichen sclerosus reported that sexual activity was rarely or never satisfactory, compared to none of the healthy controls (Haefner et al., 2014). A study of women with vulvar lichen planus, which compared their experiences to women with vulvar dermatitis and lichen sclerosus, found all three groups reported reduced dermatology-specific quality of life, which was significantly correlated with depression and sexual distress (Cheng et al., 2017).

Conditions such as psoriasis and dermatitis can present with no genital involvement, exclusively genital involvement, or both. For purposes of this report, we categorize such conditions as non-vulvar inflammatory dermatoses (NVID) when there is no genital involvement for the patient(s) in question (regardless of whether the disease can impact vulvar skin). Despite lack of direct vulvar involvement, NVID have also been associated with reduced sexual function (Ermertcan, 2009; Molina-Leyva et al., 2015). One study reported that among patients with (non-genital) psoriasis, greater disease severity correlated with greater impact on sexual function, though women with genital involvement still had worse sexual impairment than those without (Maaty et al., 2013).

Female Genital Self-Image

A decade ago, Herbenick and colleagues (Herbenick & Reece, 2010) developed and validated the 7-item Female Genital Self-Image Scale (FGSIS) in a large nationally representative sample of women in the USA, and the FGSIS has since been evaluated in diverse cultural contexts. Despite the developers’ suggestion that the FGSIS could be used to further understand the burden of genital disease (Herbenick et al., 2011), there remains a paucity of research in this area. For example, the FGSIS has been utilized in women with pelvic floor dysfunction (Handelzalts et al., 2017), dyspareunia (Pazmany et al., 2013), and vitiligo with and without vulvar involvement (Sarhan et al., 2016); however, there have been only two identified studies using the FGSIS in the context of VID (Hodges et al., 2019; Yıldız et al., 2020). One small, center-based study examined the impact of lichen sclerosus on genital self-image, finding that women with lichen sclerosus had significantly lower mean genital self-image than healthy controls (Hodges et al., 2019). The authors suggested that the FGSIS could be used as one measurement tool in evaluating the severity of vulvar disease or response to treatment, similar to initial suggestions by those who developed the FGSIS (Herbenick & Reece, 2010; Herbenick et al., 2011). More recently, a Turkish study analyzed FGSIS and the Female Sexual Function Index (FSFI) in women with lichen sclerosus and lichen planus, finding significantly lower scores than healthy or fungal controls (Yıldız et al., 2020). Additionally, in lichen sclerosus and lichen planus populations, FGSIS and FSFI were highly correlated and were both negatively correlated with anxiety (Yıldız et al., 2020).

Current Study

This study represents a national web-based survey investigating genital self-image, sexual health, and quality of life among individuals assigned female at birth, who report having been diagnosed by a healthcare provider with VID and/or NVID. There are several reasons for selecting this topic and population. First, both VID and NVID populations have yet to be characterized with regard to genital self-image. For VID, the FGSIS may represent an opportunity for longitudinal disease tracking. For people with NVID, poorer genital self-image may be associated with poorer sexual
function. Secondly, comparing these two groups, rather than utilizing healthy controls as in prior studies, represents a unique opportunity to explore sexual health and quality of life morbidity within dermatology and discern what effects are attributable to dermatologic disease status versus which are dependent on symptomatic site location(s) (i.e., vulva). Given that vulvar disease is the primary group of interest, participants with any vulvar involvement of their inflammatory skin condition(s) were categorized as VID, even if they also had non-vulvar symptoms. Participants who exclusively had non-vulvar symptoms were categorized as NVID and served as a comparison group, while also providing an opportunity to explore how inflammatory symptoms (pain, itching, irritation, and visible skin changes) may be associated with outcomes of interest. Grouping conditions by location of symptoms rather than delineating observations by specific diseases facilitates development of generalizable observations for sexual medicine in dermatology practice.

The primary outcome of interest is genital self-image, as measured by the FGSIS. As secondary outcomes, the FSFI, the PROMIS Global-10 (a global mental and physical health assessment), the Skindex-16 (a skin-specific quality of life scale), and sexual histories are examined in conjunction with the FGSIS to assess patterns of vulvar disease burden in individuals and examine the interplay of these patient-centered disease impact measures. We hypothesized that participants with VID would have lower genital self-image and sexual function (i.e., lower total scores on the FGSIS and FSFI) when compared to participants with NVID and previously described healthy populations. In addition, we included an exploratory aim which was to compare VID participants with NVID participants on additional measures (individual FGSIS items, FSFI domains, PROMIS Global-10, Skindex-16, and one-month sexual histories) to drive future hypothesis-driven work. This analysis builds understanding of variables related to sexual health in vulvar disease by elucidating the specific roles and relative importance of factors including genital self-image, sexual behavior, mental health, and global and sexual function deficits in overall vulvar disease burden. Further, the importance of sexual health care in dermatology settings is emphasized.

**Method**

**Participants**

To identify participants with these relatively rare conditions, study recruitment occurred via targeted Facebook and Instagram ads, relevant NVID and VID social networks (e.g., Facebook and Instagram pages for conditions such as lichen sclerosus, lichen planus, dermatitis, psoriasis), and online research recruitment services (e.g., ResearchMatch) between September and November 2020. Individuals of all genders, including those identifying outside a gender binary, were eligible provided they were assigned female at birth, living in the USA, ages 18 and older, and had been diagnosed with an inflammatory dermatosis (vulvar or non-vulvar) persisting longer than one month. Due to conducting this research nationally and online, verification of dermatologic diagnosis (e.g., clinically or in the medical record) was not feasible. However, the survey specifically asked participants to indicate conditions that had been diagnosed by a healthcare provider (i.e., self-diagnoses were not included).

Power analysis in prior work utilizing the FGSIS (our primary outcome) found a sample size of 15 per group was needed to detect a difference of one standard deviation based on mean national FGSIS scores with power of 80% at $p < 0.05$ (Herbenick et al., 2011; Hodges et al., 2019). Because of online recruitment, we anticipated much larger sample sizes for our study and continued to collect responses to the point of recruitment saturation (i.e., when few to no new responses were being recorded from existing recruitment efforts). The survey was accessed by 624 people, 119 of whom did not pass initial screening. Another 24 participants were removed for entering non-qualifying diagnoses (e.g., infectious or non-inflammatory diagnoses). Of the 481 eligible participants, 348 (72.3%) completed the entire survey and were included in analysis.

**Procedure**

This study received ethical approval from the institutional review board at the last author’s institution. After reviewing information about the study online, individuals could indicate their consent and proceed to complete the survey. Participants who completed the survey could choose to enter contact information (not associated with survey response) for a chance to win one of eight $25 electronic gift cards.

**Analysis**

Data were described with frequencies and percentages. The survey allowed for participants to opt-out of some demographic questions, leading to a small degree of missing data (less than 3.5% per item), though all scales and sexual history were completed in full by all participants. Paired t tests, Chi-squared tests, general linear modeling, and Pearson correlation coefficients were used to analyze data as appropriate. Analyses were performed between November 2020 and March 2021 using IBM SPSS v24 (Armonk, NY: IBM Corp). Hypotheses were not pre-registered.
Measures

A 20-min web-based survey was designed to collect relevant data using items and scales described below. The survey was part of a larger study analyzing healthcare experiences, sexual function, and quality of life among patients with VID and NVID. Additional variables, which were captured but not included in the present assessment, included diagnostic (e.g., time-to-diagnosis, number of practitioners seen, specialty of diagnosing practitioner), clinical (e.g., symptoms, complications, treatment, medical follow-up), and health literacy (e.g., how informed they feel, where they get health information) items related to the dermatologic condition identified by the participant. All relevant measures used in this study as well as data, syntax, and outputs are available upon request to the corresponding author.

Participant Characteristics

Participants were asked to respond to demographic and background questions including age, sexual orientation, race (could select more than one category), Hispanic/Latin origin, relationship and marital status, and gender identity (available options included woman (cisgender), man (transgender), genderqueer or non-conforming, non-binary, or other with the option to write in another identity). Participants self-described their household income as “comfortable,” “just enough to make ends meet,” or “not enough to make ends meet”; for analysis, the latter two categories were combined and labeled “resource-limited”, and the former was labeled “comfortably resourced.” Self-reported height and weight were collected for body mass index (BMI) calculation. Basic medical history collected included menopause status (pre-, peri-, or post-menopausal), sexually transmitted infection (STI) history, and psychiatric condition history (including mood, personality, or psychotic disorders).

Female Genital Self-Image Scale

The FGSIS (Herbenick & Reece, 2010) is a widely used measure of genital self-image that has been translated into multiple languages (e.g., Felix et al., 2017; Jansuwan et al., 2020; Kaya et al., 2019; Pakpour et al., 2014). The FGSIS has demonstrated evidence of strong internal consistency (alpha = 0.88; Herbenick & Reece, 2010); in the present study, internal reliability was high (alpha = 0.86). It is used to evaluate a person’s feelings about their vulva and vagina. This 7-item scale utilizes a 4-item response scale ranging from 0 (effect never experienced) to 100 (effect experienced). Analysis of the total scores as well as individual item scores was carried out, consistent with prior FGSIS work which frequently evaluates on both a total score and item score basis (DeMaria et al., 2011, 2012).

Female Sexual Function Index

The widely used FSFI is comprised of 19 items and provides a total score as well as measures for six domains: Desire, Arousal, Lubrication, Orgasm, Satisfaction, and Pain (with higher score indicating less severe/frequent pain) within the past four weeks. The FSFI has been shown to exhibit strong reliability (r > 0.8 for each domain) and internal consistency (alpha > 0.8 for each domain) (Rosen et al., 2000); in our study alphas ranged from 0.86 to 0.89. Higher total FSFI scores correlate with higher sexual function, with scores ranging from 2 to 36; scores less than 26.55 indicate clinical levels of sexual dysfunction (Meston et al., 2020; Wiegel et al., 2005). FSFI usage in populations where not all participants have engaged in sexual activity in the past four weeks presents methodological difficulties, as several items have a “0” response option for those who did not engage. This contributes to a lower domain and overall score but may not always be indicative of dysfunction. Various methods have been suggested to handle this issue (Brotto, 2009; Meston et al., 2020; Meyer-Bahlburg & Dolezal, 2007), though the FSFI is also frequently used in such populations without modification. Given rates of any sexual activity in the past four weeks were above 75% in both comparison groups and did not significantly differ, and due to no observed difference in FSFI total and domain comparisons between groups when those with no recent sexual activity were excluded, we retained the full sample for FSFI analysis and used the FSFI as written without modifications for “0” scores.

Skindex-16

The quality of life impact of VID was assessed with the Skindex-16 (Chren et al., 1996, 2001). A modified version of the Skindex-16 was administered as the Vulvar Skindex-16 (Thareja et al., 2016) for patients with VID; those with NVID received the standard version (Chren et al., 2001). This 16-item scale is comprised of three domains assessing the impact of disease on (1) symptoms, (2) emotions, and (3) functioning. Internal reliability for the three domains was high in the Skindex-16 (alpha = 0.86, 0.83, and 0.92, respectively, for symptoms, emotions, and functioning; Chren et al., 2001). In the present study, internal reliability was calculated separately for symptoms, emotions, and functioning domains of Skindex-16 (alpha = 0.86, 0.94, and 0.91) and the Vulvar Skindex-16 (alpha = 0.89, 0.93, and 0.91). Responses for each item are collected on a 7-item scale ranging from never bothered to always bothered by the condition. Scores range from 0 (effect never experienced) to 100 (effect experienced).
all the time). It is important to note, for results interpretations, this is the only included measure in which higher score indicates worse impact/outcome. For purposes of this study, all Skindex-16 items were modified to a timeframe of four weeks (rather than the typical one week). Standardizing all included scales to assess outcomes over the past four weeks was implemented to avoid participant confusion and facilitate comparisons between scale scores and sexual behavior in the past four weeks. Modifying Skindex-16 to a period of four weeks did not greatly reduce internal reliability as compared to original measures.

**PROMIS Global-10**

To provide a more comprehensive indicator of the relationships between VID and global health status, the PROMIS Global-10 (Cella et al., 2010; Hays et al., 2009), henceforth PROMIS, was also included. This 10-item measure reports outcomes on two domains (physical and mental health) as T-scores with mean of 50 and standard deviation of 10. Physical and mental health scales had internal consistency reliability coefficients of 0.81 and 0.86, respectively (Hays et al., 2009). In the current study, internal reliability demonstrated alphas of 0.74 and 0.82, respectively. Three items on the scale use a timeframe of the past seven days, which was modified to the past four weeks.

**Sexual Behavior**

Prior-month sexual histories, including frequency of solo and partnered sex behaviors (masturbation, receiving/performing oral sex, vaginal sex, and anal sex), were collected. Participants were asked whether they had engaged in each activity ever, and, if yes, in the past month. If they had engaged in the past month, they were asked to indicate the number of times they had participated in the activity in the past month.

**Results**

**Participant Characteristics**

For a full sample description, see Table 1. The total sample consisted of 348 participants from 48 US states and territories. The mean age of the sample was 43.1 ± 15.5 (range: 19–81). Most participants were pre-menopausal (n = 215; 62%), white (n = 300; 86%), heterosexual (n = 283; 81%), and partnered (n = 129; 75%). Overall, 101 (29%) participants reported VID, 173 (50%) had NVID, and 74 (21%) experienced both vulvar and non-vulvar manifestations.

As previously described, for purposes of analysis, participants with any vulvar disease were included in the VID group (n = 175) and instructed to complete the survey based on their vulvar symptoms, even if they had concomitant skin disease impacting other parts of their body. Participants with NVID (n = 173) served as a comparison group. If participants had more than one skin disease, they were asked to select their most bothersome condition in the past four weeks as their “primary” diagnosis. The most prevalent primary VID were lichen sclerosus (n = 110; 63%), vulvar dermatitis (n = 22; 13%), and vulvar psoriasis (n = 15; 9%), while the more prevalent NVID included non-vulvar dermatitis (n = 75; 43%), rosacea (n = 30; 17%), non-vulvar psoriasis (n = 28; 16%), and moderate-to-severe acne (n = 23; 13%).

Groups differed significantly based on race (white vs. non-white), sexual orientation (heterosexual vs. LGBQ+), BMI (under/normal weight vs. overweight/obese), menopause status (pre- vs. peri/post-menopausal), and history of STI, but not based on relationship or marital status, Hispanic/Latin origin, financial status (comfortably resourced vs. resource-limited), gender identity, or history of psychiatric condition (see Table 1). Groups also differed significantly based on age (VID 46.5 ± 15.4; NVID 39.5 ± 14.8; p < 0.001).

**Scale Outcomes**

Sexual health (FSFI, FGSIS), quality of life (Skindex-16), and mental/physical health (PROMIS) outcomes between vulvar and non-vulvar groups are displayed in Table 2 and graphically in Fig. 1. Internal reliability was high for all scales used in this study (DeVellis, 2016); specific alpha values were provided above alongside the descriptions of each scale utilized. Because VID and NVID groups differed based on age, race, sexual orientation, menopause status, BMI, and history of STI, general linear modeling was used to assess for differences in scale scores between groups with age as a covariate and the aforementioned dichotomous variables and condition type as fixed factors. Results are noted in Table 2. Overall, the VID group was noted to have significantly poorer genital self-image (measured by FGSIS) and mental health (measured by PROMIS), but not sexual function (measured by FSFI), when compared to the NVID group. Furthermore, groups did not differ in quality of life or global physical health (as measured by Skindex-16 domains and PROMIS Physical score, respectively). The prevalence of clinical female sexual dysfunction (as defined by FSFI score of 26.55 or lower (Wiegel et al., 2005)) was 82.9% (n = 145) for VID and 63.6% (n = 110) for NVID, which significantly differed (χ² = 16.5, p < 0.001).

**Exploratory Analyses of Scale Interrelationships**

In both VID and NVID groups, the FSFI and FGSIS were assessed for correlation with Skindex-16 and PROMIS domains. Results are shown in Table 3. The FSFI and FGSIS were positively correlated within both VID (p < 0.001) and...
Table 1  Participant characteristics and reported sexual behavior in past 4 weeks

|                        | Entire sample N=348 | VID n=175 | NVID n=173 | Chi-square | p-value |
|------------------------|----------------------|-----------|------------|------------|---------|
| **Age**                |                      |           |            |            |         |
| 19–24                  | 43.1±15.5            | 46.5±15.4 | 39.5±14.8  | <.001**    |         |
| 25–34                  | 45 (12.9)            | 12 (6.9)  | 33 (19.1)  |            |         |
| 35–44                  | 74 (21.3)            | 34 (19.4) | 40 (23.1)  |            |         |
| 45–54                  | 59 (16.9)            | 31 (17.7) | 28 (16.2)  |            |         |
| 55–64                  | 47 (13.5)            | 33 (18.9) | 14 (8.1)   |            |         |
| 65–74                  | 42 (12.1)            | 26 (14.9) | 16 (9.2)   |            |         |
| 75–84                  | 3 (0.9)              | 2 (1.1)   | 1 (0.6)    |            |         |
| **Gender identity**    |                      |           |            | 0.092      | 0.761   |
| Woman (cisgender)      | 335 (96.3)           | 169 (96.6)| 166 (96.0) |            |         |
| Man (transgender)      | 0 (0)                | 0 (0)     | 0 (0)      |            |         |
| Genderqueer, non-conforming, or non-binary | 8 (2.3) | 3 (1.7) | 5 (2.9) |            |         |
| **Sexual orientation** |                      |           |            | 6.499      | 0.011*  |
| Heterosexual           | 283 (82)             | 151 (87.3)| 132 (76.7) |            |         |
| LGBQ+                  | 62 (18)              | 22 (12.7) | 40 (23.3)  |            |         |
| **Race**               |                      |           |            | 4.802      | 0.028*  |
| White or Caucasian     | 300 (86.2)           | 155 (88.6)| 145 (83.8) |            |         |
| Asian or Asian American| 28 (8.0)             | 8 (4.6)   | 20 (11.6)  |            |         |
| Black or African-American| 18 (5.2)            | 4 (2.3)   | 14 (8.1)   |            |         |
| Other                  | 14 (4.0)             | 11 (6.3)  | 3 (1.7)    |            |         |
| **Hispanic/Latin origin** |                   | 20(5.7)   | 7 (4)      | 13 (7.5)   |         |
| Hispanic or Latinx     | 317 (91.1)           | 159 (90.9)| 158 (91.3) |            |         |
| Not Hispanic or Latinx | 16 (4.6)             | 6 (3.5)   | 10 (5.8)   |            |         |
| **Financial status**   |                      |           |            | 0.208      | 0.648   |
| Comfortably resourced  | 228 (66.3)           | 116 (67.4)| 112 (65.1) |            |         |
| Resource limited       | 116 (33.7)           | 56 (32.6) | 60 (34.9)  |            |         |
| **Relationship status**|                      |           |            | 0.096      | 0.757   |
| Partnered              | 262 (75.3)           | 133 (76)  | 129 (74.6) |            |         |
| Not partnered          | 86 (24.7)            | 42 (24)   | 44 (25.4)  |            |         |
| **Marital status**     |                      |           |            | 2.767      | 0.096   |
| Married                | 176 (50.7)           | 96 (55.2) | 80 (46.2)  |            |         |
| Unmarried              | 171 (49.3)           | 78 (44.8) | 93 (53.8)  |            |         |
| **BMI**                |                      |           |            | 4.535      | <.001** |
| < 25 (Under/normal weight) | 130 (37.5)           | 48 (27.6)| 82 (47.4)  |            |         |
| ≥ 25 (Overweight/obese) | 217 (62.5)           | 126 (72.4)| 91 (52.6)  |            |         |
| **Menopause status**   |                      |           |            | 11.126     | 0.001** |
| Pre-menopausal         | 215 (61.8)           | 93 (53.1) | 122 (70.5) |            |         |
| Peri-/post-menopausal  | 133 (38.2)           | 82 (46.9) | 51 (29.5)  |            |         |
| **STI history**        |                      |           |            | 10.641     | 0.001** |
| Positive               | 105 (30.8)           | 67 (39.2) | 38 (22.4)  |            |         |
| Negative               | 236 (69.2)           | 104 (60.8)| 132 (77.6) |            |         |
| **Psychiatric history**|                      |           |            | 0.481      | 0.488   |
| Positive               | 234 (68)             | 114 (66.3)| 120 (69.8) |            |         |
| Negative               | 110 (32)             | 58 (33.7) | 52 (30.2)  |            |         |
| **Condition type**     |                      |           |            |            |         |
| Vulvar only            | 101 (29)             | 101 (57.7)|            |            |         |
| Non-vulvar only        | 173 (49.7)           | 173 (100) |            |            |         |
| Both (placed in VID group) | 74 (21.3)           | 74 (42.3) |            |            |         |
NVID (p = 0.001) groups. In the NVID group, Skindex-16 did not correlate with either FGSIS or FSFI, though both PROMIS Mental and Physical scores were positively correlated with both measures. In the VID group, the FGSIS was correlated negatively with all three domains of Skindex-16 and positively with both PROMIS domains (p < 0.001), while FSFI was only correlated (negatively) with Skindex-16-Functioning (p = 0.011).

Correlations within sexual health measure scores (FSFI domains and FGSIS items) offered differing outcomes in VID and NVID groups. For example, for the VID group, endorsing that one’s genitals “work how they are supposed to work” (an item of perceived genital function from the FGSIS), was the only item that significantly positively correlated with all domains of FSFI. Despite the consistency of positive genital feelings correlating with FSFI domains among participants with NVID, that item was only correlated with two domains (satisfaction and pain) among participants with VID. Full results are available in supplementary material.

**Sexual Behavior**

Sexual behaviors over the past four weeks are summarized in Table 1. Participants with VID were significantly less likely to have a history of vaginal (p < 0.001) or oral sex (performing [p = 0.003] or receiving [p = 0.001]) in the past four...
weeks, but not less likely to have engaged in masturbation ($p = 0.737$). Among those participants who did participate in sexual activities in the past four weeks, participants with VID participated in vaginal sex fewer times in the designated period ($p = 0.006$), though this did not hold true for giving oral sex ($p = 0.056$), receiving oral sex ($p = 0.230$), or masturbation ($p = 0.543$). Only 11 participants (3.1%) reported any anal sex in the past four weeks; thus, this behavior was not further analyzed in our sample.

**Discussion**

This study used a web-based survey completed by 348 US participants who had been assigned female at birth and who self-reported having been diagnosed with an inflammatory dermatosis. We sought to first quantify the relative sexual health experiences for each group using two widely used, validated measures assessing genital self-image (FGSIS), and sexual function (FSFI), respectively. In addition to the findings from this primary outcome, we provide as a secondary outcome a series of exploratory analyses regarding the association of VID and NVID with genital self-image scores, quality of life and mental health, and sexual behavior, with recommendations for future research to further quantify, understand, compare, and address the full scope of the sexual health experiences within VID and, by extension, NVID. Individuals with VID reported lower genital self-image and lower mental health than those with NVID. Rates of sexual dysfunction were high in both groups (> 60%). Findings suggest that in VID, lower genital self-image is correlated with poorer sexual function, quality of life, and global physical and mental health. Findings contribute to the available body of work exploring sexual health in individuals with VID, while also providing comparison to individuals experiencing NVID.
Female Genital Self-Image Scale and Female Sexual Function Index

We hypothesized that participants with VID would have significantly lower scores on the FGSIS and FSFI compared to NVID peers. After correcting for demographic factors, participants with VID did demonstrate significantly lower genital self-image, though sexual function as measured by FSFI scores did not differ between groups. This indicates that to some extent, reduced sexual function in participants with VID may be explained by other characteristics present in this population, such as older age (Addis et al., 2006) or higher rate of overweight/obesity (Kolotkin et al., 2006). The relationship of VID to genital self-image is not fully explained by such differences and may be a product of vulvar disease itself. Furthermore, impaired sexual health in VID may be shaped by lower genital self-image, which is not specifically tested in the FSFI. However, the present study is cross-sectional and cannot determine that; subsequent longitudinal research would support a greater understanding of the directionality of such relationships.

Our work is consistent with two small prior studies utilizing FGSIS in patients with VID demonstrating lower genital self-image scores among women with lichen sclerosus and lichen planus (Hodges et al., 2019; Yildiz et al., 2020). The present report serves to further confirm these results in a larger sample comprised of greater diversity of vulvar dermatologic conditions and further expands the literature by including a comparison to participants with non-vulvar dermatologic conditions.

Exploratory Analyses: Female Genital Self-Image Scale Items

Additional exploratory analyses offered insight regarding FGSIS items. In interpreting differences between FGSIS items, it is important to note that though there are statistically significant differences, the clinical significance of such
differences is not yet known. One limitation of this analysis is that multiple statistical approaches may increase the possibility of Type I error. Given this consideration, we suggest that these results do not in isolation warrant change in practice but rather that emergent trends are explored in future work to develop theoretical approaches to VID management and mitigation of the effects of VID on genital self-image through various therapeutic methods. For example, this area of study would likely benefit from qualitative work to address the meaningfulness of FGSIS item concepts in the lived experience of disease burden. With these considerations, we present the following observations as areas for future study.

VID patients scored significantly lower across all individual FGSIS items except two: “I think my genitals smell fine” and “I am comfortable allowing a healthcare provider to examine my genitals.” In a large sample of healthy individuals, the mean score for the healthcare provider item was 3.12 (Herbenick & Reece, 2010); in the present study, means were slightly lower for both groups, at 2.98 (NVID) and 2.91 (VID). People with VID likely undergo more frequent genital examinations and may view genital examinations as opportunities to learn about the state of their vulvar condition and possible management options, when symptomatic. In a prior study of healthy, college-aged women, participants with lower genital self-image were less likely to attend gynecologic appointments (DeMaria et al., 2011, 2012). In people with VID, an aversion to genital examinations by healthcare providers could lead to significant delays in seeking care. Embarrassment or shame with healthcare provider interactions has been identified as a barrier to care in some women (Bentham et al., 2012; Rivera et al., 2022; Wehbe-Alamah et al., 2012).

Considering differences between correlations of FSFI domains and FGSIS items offers a richer context for exploring these distinct but related measures. Feeling that one’s genitals “work” or function as they should was a significant predictor of every domain of FSFI for people with VID. This may involve modifications to sexual activity (e.g., masturbation or oral sex rather than penetrative intercourse; masturbating with one’s hand rather than a vibrator; addition of a lubricant), as well as thought exercises in reestablishing certain aspects of genital function that can be reclaimed or maintained (e.g., “My genitals can still help me to feel turned on” and “My body is still capable of experiencing orgasm”). These strategies could be incorporated into VID-specific cognitive behavioral therapy, couples therapy, or other treatment programs, as informed by successes in the vulvodynia/vestibulodynia and vaginismus literature (Brotto et al., 2013, 2015a; Brotto et al., 2015b; Masheb et al., 2009; Zgueb et al., 2019). Mindfulness programs aimed at improving self-efficacy and reducing pain catastrophizing have been effective in provoked vestibulodynia (Brotto et al., 2013, 2015a) and could be adapted to support the subjective experience of VID-associated pain. Furthermore, sexual difficulties have demonstrable negative effects on partners of affected individuals and contribute to relationship strain (Sadownik et al., 2017); thus, therapeutic approaches that address couple dynamics are strongly recommended for partnered patients.

**Exploratory Analyses: Quality of Life and Mental and Physical Health**

Skindex-16 and PROMIS Mental and Physical scores were also compared between VID and NVID groups to explore additional factors impacting the health status of the VID population. PROMIS Mental scores were significantly lower in participants with VID than peers with NVID, indicating poorer mental health. All three Skindex-16 domain scores and PROMIS Physical scores did not differ between groups. Limited research has examined mental health in the context of VID, though it is frequently postulated that rates of comorbid anxiety and depression are high (Cheng et al., 2017; Konuk et al., 2007; Lundqvist et al., 2006; Yıldız et al., 2020). Idiopathic dyspareunia is associated with depression (Leeners et al., 2015). Notably, the NVID and VID groups did not differ significantly in rates of psychiatric diagnoses in our study, including mood, personality, or psychotic disorders. Age could be a confounding factor, as the NVID group was younger; psychiatric illness (particularly mood disorders) has
become less stigmatized and mental healthcare more widely utilized among younger individuals (Lipson et al., 2018). The relationship between mental health and vulvar disease is complex and frequently mismanaged. People with VID report that healthcare providers at times attribute their experience of vulvar symptoms to psychiatric conditions, leading to patient frustration, delays in care, and adverse healthcare experiences (Rivera et al., 2022). Clinical evaluation of people with confirmed or possible VID should include mental health screening in addition to—and never instead of—a thorough physical examination and careful history of symptoms.

**Exploratory Analyses: Sexual Behavior**

An additional exploratory goal of this work was to characterize and compare sexual behaviors of study groups. Fewer people with VID participated in vaginal intercourse in the prior four weeks (41% vs 60%), and those who did, participated less often (4 vs 7 times), as compared to NVID peers. Approximately 50–60% of the adult population had intercourse in a month (Herbenick et al., 2010), consistent with the NVID sample. However, estimates of typical frequency of intercourse suggest approximately once per week (Twenge et al., 2017), or four times monthly, indicating both VID and NVID groups had intercourse at or above national average rates. Several factors could have inflated numbers in either group, including recall bias or self-selection of a more sex-positive study sample, though notably this research was conducted during the Covid-19 pandemic in which national studies found a decrease in sexual activity (Hensel et al., 2020; Lehmler et al., 2021; Luetke et al., 2020). As for non-penetrative sex, fewer participants with VID participated in oral sex (receiving or performing) compared to the NVID sample. Notably, the proportion of participants practicing masturbation in the past month did not differ between VID and NVID groups. National data indicate rates of masturbation of 20–50% in a given month (Herbenick et al., 2010), with our study population having rates over 50% in both groups. Subsequent research might investigate how people with VID masturbate. Given that people with VID may experience inflammation, itching, pain, discomfort, or tearing, it may be that some proportion find a vibrator to cause discomfort or physical trauma to their vulva. People may need to adapt their masturbation in any range of ways—e.g., frequency, method, intensity, addition of lubricant—but currently there is a dearth of research in these areas.

Furthermore, the number of times practicing masturbation or oral sex was not significantly different in VID despite lower genital self-image in this group. This is a notable finding, given that previous research finds lower genital self-image correlates with lower rates of oral sex and masturbation (Herbenick et al., 2011; Wiegel et al., 2005). People with vulvar disease thus represent a unique group in terms of genital self-image and sexual behavior. Subsequent research might examine these issues in greater detail, such as from an intimate justice perspective (McClelland, 2010): What kind of pleasure do people with VID believe they can expect from sex, and under what conditions? To what extent do people with VID engage in partnered sex for their pleasure as opposed to reasons such as relationship maintenance or sexual compliance?

**Future Directions**

The FGSIS may prove useful in longitudinal vulvar disease tracking, as previously suggested (Hodges et al., 2019). The FGSIS was correlated with all five Skindex-16 and PROMIS subscales, while FSFI was only correlated with Skindex-16-Functioning. This suggests that, particularly in VID, FGSIS as a measurement tool is sensitive to quality of life and general health, while also being an indicator of sexual health. Attempts at VID monitoring are currently infrequent and inconsistent (Simpson et al., 2012). A study of genital psoriasis found that routine follow-up assessment using measurements of sexual quality of life and patient- and provider-rated psoriasis severity provided a useful barometer for treatment success (Meeuwis et al., 2015). Without vital signs or laboratory tests available to monitor vulvar conditions, creating a patient-centered protocol is vital to treatment monitoring and success, with the patient’s improved quality of life and functioning as primary treatment goals (Hodges et al., 2019).

Study findings also offer new perspectives on sexual health and quality of life among people with NVID, though results should be interpreted cautiously given lack of healthy control group. Notably, genital self-image in the NVID group was consistent with previously studied healthy controls (Herbenick et al., 2011), though prevalence of sexual dysfunction was still high, affecting greater than sixty percent of participants with NVID. The prevalence of sexual difficulties nationally is estimated at 40% or higher (Allahdadi et al., 2009; Laumann et al., 1999). Dermatologic care for patients with NVID should include discussions of sexual function as appropriate. It is important to keep in mind that assessing skin-related quality of life will not always elicit any existing sexual difficulties, and separate interview questions or measures addressing sexual function may give a more complete picture of dermatologic disease impact. Future work should investigate how to best address sexual health with patients with dermatologic disease through both qualitative and quantitative analyses and comparison to healthy controls.
Strengths and Limitations

Our research was subject to several strengths and limitations. First, the present study makes a unique contribution in its examination of genital self-image and sexual health in VID; such conditions are vastly understudied despite their impact on patients’ sexual lives. Additionally, our survey was online, which allowed for anonymous participation; online data collection has been shown to enhance the reporting of sensitive topics (Kays et al., 2013). We were able to recruit a large number of participants during the Covid-19 pandemic, without risk to their health. We also used reliable and valid measures to examine sexual health, quality of life, and global mental/physical health. Our study also had several limitations. Among these is the lack of inclusion of a healthy control group. Also, due to distribution via numerous online mechanisms, we are unable to calculate a survey response rate and thus our survey is not generalizable to the larger population of people with VID and NVID. Online distribution further limited this study by relying on patient-reported rather than clinically verified diagnoses, and the study sample may have self-selected as more sex-positive individuals willing to answer questions on sensitive topics. While this study was inclusive of sexual and gender diversity, and our sample comprised somewhat larger proportions of LGBQ+ and gender-diverse individuals than is typically reported in the population (Wilson & Meyer, 2021), racial/ethnic minorities were under-represented and there were no transgender participants; subsequent research that is more focused on either of these groups of individuals who experience VID and may have unique experiences would be a contribution to the existing limited literature. Finally, our study was cross-sectional and thus cannot address directionality of our findings; subsequent longitudinal studies are needed.

Conclusion

Sexual dysfunction can be a severe cause of morbidity in VID. This study contributes to the literature assessing genital self-image utilizing the FGSIS in this population, and we further extend the literature by including assessment of genital self-image for individuals with NVID. Findings suggest that, in VID, genital self-image correlates not only with sexual health but also quality of life and physical and mental health. This study helps elucidate important differences in the FGSIS and FSFI as measurement tools, several of which are pertinent to vulvar disease. Previous recommendations to consider the FGSIS for longitudinal disease tracking are reinforced, and future work should trial FGSIS for this purpose. Improved genital self-image could be a simple, quantifiable treatment goal in patients with vulvar disease and is easily assessed in the clinical environment, especially given the brevity of the 7-item FGSIS. More generally, findings underscore the importance of assessment of sexual health and function in both genital and general dermatologic care. Consistent identification of sexual dysfunction and any associated mental health or quality of life outcomes will serve to normalize sexual health care and improve patient outcomes in both vulvar and non-vulvar dermatologic disease.

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Ethical Approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Purdue University (approved August 14, 2020. No. IRB-2020–812).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

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