

Evidence Against a Link Between Hyperemesis Gravidarum and Personality Characteristics from an Ethnically Diverse Sample of Pregnant Women: A Pilot Study

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Abstract

Background: Hyperemesis gravidarum (HG), a pregnancy-related condition marked by extreme nausea and vomiting, has been considered a psychosomatic illness associated with long-standing personality characteristics (e.g., hysteria). In this pilot study, we examined personality, somatic, and psychological variables with ethnically diverse samples of women with HG and women with typical levels of nausea and vomiting of pregnancy (NVP).

Methods: Personality (Minnesota Multiphasic Personality Index-2 [MMPI-2] and MMPI-2RF), somatic (MMPI-2RF), and psychological (Beck Depression Inventory-II [BDI-II] and NVP-related quality of life) variables collected during the first trimester of pregnancy were compared between 15 women with HG and 15 women with normal levels of NVP matched for age, education, marital status, insurance source, and race/ethnicity. A secondary analysis was performed comparing these variables among a group of 9 asymptomatic pregnant women to the HG and NVP groups.

Results: No significant differences were found between the HG and NVP groups on any personality, somatic, or psychological variables. Both groups had clinically significant elevations on the MMPI-2 hypochondriasis scale, which incorporates somatic symptoms. The NVP group had a clinically significant elevation on the MMPI-2RF gastrointestinal complaints scale. Both groups had significantly higher means on the MMPI-2 and MMPI-2RF scales than the asymptomatic group. Predominantly Spanish speakers appeared particularly vulnerable to psychological distress associated with somatic complaints.

Conclusions: The results of this pilot study suggest that research with HG patients is feasible and that psychological distress expressed by women with HG and NVP may reflect reactions to somatic symptoms. No evidence was found to support an association between HG and personality characteristics. Recommendations for future research are provided, such as examining the potential benefits of translation services for Spanish-speaking HG patients.

Introduction

NAUSEA AND VOMITING DURING PREGNANCY (NVP) are considered normative somatic experiences, particularly during the first trimester.¹ The severity of NVP varies along a continuum, with the majority (60%–80%) of expectant mothers experiencing mild to moderate bouts of morning sickness.^{1–3} When considering the extremes of the NVP severity range, approximately 25% of pregnant women report having had few to no NVP symptoms, whereas upward of 2% face severe and debilitating forms of NVP.^{1–3} This latter category

of acute, unrelenting NVP is a rare condition known as hyperemesis gravidarum (HG).^{1–3} Women diagnosed with HG are regularly hospitalized for dehydration, malnutrition, electrolyte imbalances, ketosis, and weight loss and have increased risk for preeclampsia/eclampsia that could cause neurological damage—all of which ultimately put the health of both the mother and fetus at risk.^{2–6} In addition to health risks, HG has been associated with negative psychosocial and socioeconomic outcomes.^{4,5,7}

Aside from the rarity of the disorder, HG continues to perplex the medical community because of its lack of clear

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etiology. Growing evidence supports the theory that HG may be an adverse reaction to physiological changes during pregnancy (e.g., altered hormone levels or gastrointestinal tract abnormalities).¹⁻⁴ Other, more long-standing and pervasive theories suggest that the cause of HG may have psychiatric underpinnings or may be associated with psychosocial risk factors, such as stress.¹⁻⁴ Most psychogenic theories of HG come from the psychoanalytic field, where pregnancy is viewed as a time of increased vulnerability to conversion disorders, such as hysteria, and psychiatric comorbidity.^{4,5,8} Fairweather,⁹ whose study of 44 HG patients, using the well-validated Minnesota Multiphasic Personality Index (MMPI),¹⁰ concluded that women who develop HG also tend to have infantile personalities marked by hysteria and excessive maternal dependence. Other etiological theories suggest that the extreme vomiting is the mother's symbolic rejection of the fetus or womanhood.¹¹ Since the Fairweather study, the perception that HG is largely a psychosomatic illness stemming from disordered personality continues to persist throughout the medical community, despite the fact that his study and the few studies that followed it with similar findings had serious methodological flaws, such as lacking a non-HG control group.¹² The clinical implications of viewing HG as a psychologically determined condition are widespread and grim, ranging from compromised medical care because of the perception of HG patients as difficult or making themselves sick for attention to overlooking dangerous somatic symptoms that are not thought to be biological in origin.^{11,12} In a qualitative study of the experiences of 96 women with HG interviewed from 1994 to 1997, Munch¹² reports that the vast majority of women viewed the cause of their condition as entirely biological and that psychological distress was the result of both the physiological distress and the extent to which HG disrupted their daily functioning. In the absence of objective, empirical evidence supporting or refuting psychogenic theories of HG, the extent to which personality characteristics are involved in the course of the condition, either as a cause, reaction, or both, remains unclear.

The few studies that have examined the role of psychological factors in the course of HG have focused primarily on comparing women with HG to asymptomatic pregnant women^{7,9} despite the fact that NVP occurs in the vast majority of pregnancies. Additionally, most participants in these studies have been middle-class white women, leaving little known about the experiences of pregnant women from other socioeconomic and ethnic backgrounds. The primary goal of this pilot study was to consider diverse samples of pregnant women experiencing NVP and women diagnosed with HG in order to compare their responses on measures of personality, somatic, and psychological factors. By comparing the HG group to a sample of otherwise healthy pregnant women with NVP, it may be possible to clarify further whether or not women with NVP also have elevated psychiatric symptoms. A matched-pairs design was used to control for age, years of education, marital status, insurance source, and race/ethnicity. In secondary analyses, we compared a sample of asymptomatic pregnant women to the HG and NVP groups in order to see if previous findings documenting psychiatric differences between asymptomatic pregnant women and those with HG could be replicated with the NVP group in the present study. A secondary goal for this pilot study was to identify demographic correlates of quality of life within each

group, such as age, years of education, marital status, insurance source, race/ethnicity, and acculturation level. The findings from this pilot study can be used to inform the design of future, larger studies as well as to test the feasibility of such research.

Materials and Methods

Participants and procedures

All study procedures were approved by the Los Angeles County Hospital and University of Southern California Institutional Review Boards. This study was part of a larger study investigating the clinical, physiological, and biochemical characteristics of women with HG and a community sample of pregnant women.¹³ HG was defined as persistent vomiting unrelated to other causes that required hospitalization for treatment with intravenous fluids or parenteral nutrition. Participants were interviewed during their first trimester of pregnancy. Women with HG were given the opportunity to schedule their interview at times when they were feeling well enough to participate. Women were paid \$75 for their participation.

Women diagnosed with HG were recruited during admission to local hospitals in the Los Angeles area that serve predominantly low-income racial and ethnic minorities. Women in the comparison groups were recruited from local clinics and the community (via newspaper ads) in Los Angeles and Orange Counties. This non-HG sample was separated into two groups based on endorsement of NVP symptoms, one group with symptoms (NVP group) and a group of asymptomatic pregnant women. NVP symptoms were assessed using four items drawn from the Nausea & Vomiting of Pregnancy Quality of Life¹⁴ questionnaire's physical domain subscale, where participants either endorsed or denied experiencing nausea, vomiting, sick stomach, or poor appetite during the past week (Cronbach's internal reliability coefficient = 0.90). Therefore, the HG and non-HG groups were established by the study design and recruitment strategy, whereas the NVP and asymptomatic subgroups were delineated based on NVP symptoms. Pregnant women were eligible to participate in the study if they were able to read and write in English or Spanish.

A total of 96 women was recruited into the larger study from which we created our study samples. All the data included in this pilot study came from this sample of participants. The results of an analysis of variance (ANOVA) indicated that there were no significant differences in age, years of education, marital status, insurance source (private vs. public), or race/ethnicity among the HG, NVP, and asymptomatic groups. Of the 96 women, 59 completed the personality, somatic, and psychological study measures, with a total of 15 women with HG and 44 without HG. Of the 44 women without HG, 35 met criteria for the NVP group and 9 women were asymptomatic. All the women in the HG group were matched to 15 women from the NVP group on age, years of education, marital status, insurance source, and race/ethnicity. Demographic characteristics of the HG, NVP, and asymptomatic groups are presented in Table 1. There were no significant differences in demographic variables between the 39 women included in the analyses and the 57 who were excluded because of having incomplete personality, somatic, or psychological data. All pregnancies were single. As a

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

	HG group (n = 15)	NVP group (n = 15)	Asymptomatic group (n = 9)
Age (mean years, SD)	27.1 (7.94)	27.4 (4.90)	29.89 (7.94)
Age range	18–35	20–39	19–44
Education (mean years, SD)	12.1 (3.61)	12.1 (4.01)	13.1 (2.15)
<High school	3 (20%)	3 (20%)	0
Some high school	3 (20%)	3 (20%)	1 (11%)
High school graduate	5 (33%)	3 (20%)	3 (33%)
Some undergraduate	0	2 (13%)	4 (44%)
Bachelor's degree	2 (13%)	2 (13%)	1 (11%)
More than bachelor's degree	2 (13%)	2 (13%)	0
Marital/partner status (n)			
Currently partnered	12 (80%)	12 (80%)	7 (78%)
Not currently partnered	3 (20%)	3 (20%)	2 (22%)
Insurance source (n)			
Government supported	11 (73%)	11 (73%)	7 (78%)
Private insurance	4 (27%)	4 (27%)	2 (22%)
Race/ethnicity (n)			
Hispanic/Latina	10 (67%)	8 (53%)	6 (67%)
African American/black	2 (13%)	3 (20%)	2 (22%)
Asian American	1 (7%)	1 (7%)	0
White	2 (13%)	3 (20%)	1 (11%)

Due to rounding, percentages may not equal 100%.

HG, hyperemesis gravidarum; NVP, nausea and vomiting of pregnancy; SD, standard deviation.

measure of parity, nulliparous status was assessed by asking participants if this was their first pregnancy (nulliparous) or not. Rates of nulliparity among the HG, NVP, and asymptomatic groups were not significantly different ($p = 0.62$); 4 women in the HG group, 4 women in the NVP group, and 6 women in the asymptomatic group had not been pregnant before.

Measures

Study measures were available in English and Spanish, based on participants' language preference. Cronbach's internal reliability coefficients were calculated for each scale used to evaluate internal consistency and reliability based on the full sample from the larger study.

Demographic variables. Demographic information was collected from participants, including age, years of education, marital status, insurance source (public vs. private), and race/ethnicity. For added context, acculturation was assessed with Spanish-speaking participants. The Short Acculturation Scale for Hispanics¹⁵ consists of 12 items assessing the extent of English or Spanish language used in general communications and for media (i.e., movies, music, and television) and ethnicity of a respondent's social networks. Each item is rated on a 5-point Likert-type scale, with higher scores indicating higher levels of acculturation to mainstream America. Items were summed for a total score. Cronbach's internal reliability for this scale was 0.97, indicating high scale reliability.

Personality and somatic variables. The MMPI-2¹⁶ was used to assess personality and psychiatric symptomology. The 567-item measure includes psychiatric clinical scales assessing hypochondriasis, depression, hysteria, psychopathic deviance, paranoia, psychoasthenia, schizophrenia, and hypomania.

Respondents indicate whether each item is true or false most of the time. Cronbach's internal reliability coefficients for these scales were all above 0.75, with the exception of the hypochondriasis scale, which demonstrated borderline reliability (0.68). The MMPI-2 profiles were rescored using the MMPI-2 Restructured Form.¹⁷ The updated analytic structure includes 338 of the original MMPI-2 items and separates somatic complaints from psychiatric subscales, providing a clearer picture of items contributing to clinically significant elevations. The following scales (and clinical subscales) were included in this study: emotional/internalizing dysfunction (demoralization, low positive emotions, and dysfunctional negative emotions), thought dysfunction (cynicism, ideas of persecution, and aberrant experiences), behavioral/externalizing dysfunction (antisocial behavior, hypomanic activation), somatic complaints (malaise, gastrointestinal complaints, head pain, and neurological complaints), and psychoticism. As it has been shown that medical and Spanish-speaking samples tend to score roughly 10 points higher than their counterparts across most subscales, the criterion for clinically significant elevation was set for scores ≥ 70 , rather than the typical cutoff of 60.¹⁸ The internal reliability of the higher order and restructured clinical scales ranged from borderline ($\alpha = 0.67$) to excellent ($\alpha = 0.87$). The internal reliability statistics for somatic complaints subscales were not as strong ($\alpha = 0.22$ – 0.58), as these scales were used as indicators of physical symptom frequency (e.g., stomach sickness and headaches) rather than measures of unified constructs and served descriptive purposes.

Psychological variables.

Depression. Symptoms of depression were measured using the widely used and well-validated Beck Depression Inventory-II (BDI-II).¹⁹ The BDI-II is a 21-item scale assessing somatic (e.g., loss of energy, changes in appetite)

and cognitive (e.g., sadness, worthlessness) symptoms of depression. The 13 somatic and 8 cognitive items are rated on a 4-point Likert-type scale. Scores are based on the sum of items for each scale, with higher scores indicating worse depressive symptomatology. Cronbach's internal reliability coefficient for this scale was 0.91 for the total scale and 0.91 and 0.73 for the cognitive and somatic scales, respectively.

NVP-related quality of life. Quality of life specific to NVP experiences was assessed using the validated Health-Related Quality of Life for Nausea and Vomiting during Pregnancy (NVPQOL)^{14,20} questionnaire. This 30-item measure assesses the impact of NVP symptoms on the quality of life of an expectant mother in four domains: physical, emotional, fatigue, and limitations in social/occupational activities. Because items from the physical domain subscale were used to define the NVP subgroups, the subscale was not included in the final analyses. Items are rated on a 7-point Likert-type scale ranging from 1 (All of the time) to 7 (None of the time). Items are summed within each domain, with higher scores indicating better quality of life. Cronbach's internal reliability coefficients were 0.98 for the NVPQOL composite scale, and those of the subscales ranged from 0.91 to 0.97, indicating excellent scale reliability.

Data analysis

For the primary analysis, mean comparisons on MMPI-2, MMPI-2RF, BDI-II, and NVPQOL scores were calculated using a paired Student's *t* test. Women in the HG group were matched to 15 women from the NVP group on age, years of education, marital status, and insurance source. Race/ethnicity matches were made for the majority of the sample, with the exception of two pairs (2 Hispanic HG patients were matched with an African American and a Caucasian woman from the NVP group); however, the two pairs were matched on all other key demographic variables. In the event that more than 1 non-HG participant could be matched to 1 of the HG patients, the match was selected randomly. In the secondary analysis, personality, somatic, and psychological variables were compared between the asymptomatic group and the HG and NVP groups using a one-way analysis of covariance (ANCOVA), with age, years of education, marital status, insurance source, and race/ethnicity as covariates. Lastly, demographic variables from the HG and NVP groups were correlated with the NVPQOL scales to identify correlates of quality of life.

Results

Primary analysis: Matched HG and NVP group comparisons

Means and standard deviations (SD) for personality variables are listed in Table 2. The MMPI-2 hypochondriasis scale mean was clinically elevated, with both the HG and NVP groups having means above a criterion score of 70. Among the MMPI-2RF scales, the gastrointestinal complaints mean for the NVP group was the only clinically significant elevation. The HG and NVP groups did not significantly differ from one another on any MMPI-2 or MMPI-2RF scales. The number of women in each group with clinically significant elevations on MMPI-2RF higher-order scales and the somatic complaints scale for the two groups is presented in Table 3.

Means and SDs for psychological variables are listed in Table 4. The paired-samples *t* test did not reveal any significant mean differences between the HG and NVP groups on the BDI-II or NVPQOL scales.

Secondary analysis: HG, NVP, and asymptomatic group comparisons

A few outlying responses were detected among the responses from 1 participant in the asymptomatic group using Grubb's method of outlier detection.²¹ When rerunning the analyses excluding these outlying scores (a trimmed mean analysis), the results of the ANCOVA were consistent with the original findings; however, two significant findings emerged that had not been significant previously. The asymptomatic group mean for the MMPI-2RF demoralization and dysfunctional negative emotions scales were significantly lower than both the NVP and HG group means for demoralization and significantly lower than the HG mean for dysfunctional negative emotions. The HG and NVP groups, however, did not significantly differ from one another on these scales, and there were no changes in scales that would indicate severe psychiatric issues.

Significant results of the one-way ANCOVA comparing personality, somatic, and psychological variables for the asymptomatic group with the HG and NVP groups are provided in Table 5. A total of 30 subscales was included in this analysis. The mean for hypochondriasis for women in the asymptomatic group was significantly lower than those of both the HG and NVP groups. When considering the MMPI-2RF scales, the means for gastrointestinal complaints and malaise for the asymptomatic group were significantly lower than those of the HG and NVP groups. All *p* values from the nonsignificant comparisons were >0.10. The asymptomatic group reported significantly higher NVP-related quality of life than did the HG and NVP groups across all domains.

Exploratory analyses: Demographic correlates of NVPQOL

Correlations between demographic variables and NVPQOL were calculated using the data from the women included in the HG and NVP groups. For both groups, being Hispanic correlated significantly with NVPQOL emotion and limitations domains, such that Hispanic women tended to have worse quality of life within these domains. Of note, general language use among the HG group was significantly correlated with NVPQOL emotional domain scale ($r = 0.65$, $p = 0.04$), such that primarily Spanish-speaking women with HG had lower emotional quality of life scores.

Discussion

In this pilot study, comparisons were made between women with HG and pregnant women with NVP on measures of personality, somatic, and psychological symptoms and ratings of quality of life relevant to the experience of NVP. No significant differences were found on any measure of personality or psychiatric disorder between the two groups. These results suggest that the women in the HG group were no more likely to have elevated psychiatric symptoms or disturbances than the pregnant women with normal levels of NVP.

TABLE 2. PAIRED *t* TEST RESULTS COMPARING PERSONALITY VARIABLES BETWEEN HYPEREMESIS GRAVIDARUM AND NAUSEA AND VOMITING OF PREGNANCY GROUPS

Scale/subscales	HG group (n = 15) Mean (SD)	NVP group (n = 15) Mean (SD)	p value	Internal reliability ^a
MMPI-2				
Hypochondriasis	72.3^b (9.37)	70.9 (8.26)	0.625	0.68
Depression	69.3 (14.28)	63.0 (15.31)	0.248	0.85
Hysteria	66.5 (14.26)	65.3 (15.03)	0.804	0.89
Psychopathic deviate	56.5 (10.62)	61.1 (17.50)	0.443	0.83
Paranoia	57.3 (11.10)	58.9 (15.06)	0.759	0.79
Psychoasthenia	57.5 (9.12)	55.7 (13.27)	0.671	0.82
Schizophrenia	57.7 (9.06)	63.0 (13.42)	0.138	0.86
Hypomania	50.4 (7.04)	53.5 (10.97)	0.230	0.80
MMPI-2RF				
Higher-order scales				
Emotional/internalizing dysfunction	57.5 (12.60)	53.9 (10.43)	0.428	0.73
Thought dysfunction	57.3 (10.90)	57.7 (14.41)	0.917	0.87
Behavioral/externalizing dysfunction	50.4 (8.45)	50.7 (13.21)	0.926	0.81
Restructured clinical scales				
Demoralization	56.8 (10.73)	54.4 (9.21)	0.514	0.82
Somatic complaints (general)	66.8 (10.50)	66.6 (11.90)	0.952	0.67
Low positive emotions	55.3 (15.50)	54.7 (13.05)	0.882	0.78
Cynicism	57.9 (13.5)	54.3 (11.45)	0.355	0.84
Antisocial behavior	52.5 (9.01)	51.1 (14.10)	0.731	0.67
Ideas of persecution	60.5 (11.98)	62.1 (15.9)	0.748	0.83
Dysfunctional negative emotions	55.1 (11.67)	52.5 (14.93)	0.606	0.86
Aberrant experiences	56.7 (10.98)	54.9 (10.10)	0.631	0.82
Hypomanic activation	47.7 (7.40)	50.6 (11.63)	0.256	0.79
Somatic complaints (specific)				
Malaise	67.1 (10.75)	61.8 (13.75)	0.249	0.44
Gastrointestinal complaints	67.5 (19.77)	76.0 (16.47)	0.229	0.52
Head pain	59.1 (12.61)	59.7 (10.25)	0.861	0.22
Neurological complaints	61.2 (14.57)	61.5 (14.25)	0.954	0.58
Personality pathology scale				
Psychoticism	56.1 (10.81)	59.2 (14.08)	0.502	0.81

^aCronbach's internal reliability coefficient.

^bClinically significant elevations in bold.

MMPI, Minnesota Multiphasic Personality Inventory.

When examining how these two groups compared with a sample of pregnant women who were asymptomatic with respect to NVP, a few differences were found, but these differences were mostly related to scales that tapped into somatic symptoms (i.e., MMPI-2 hypochondriasis, MMPI-2RF gas-

trointestinal complaints, and NVPQOL domains). Given that the hypochondriasis means for the HG and NVP groups were both <1 SD below the mean (HG, *z* = -0.28; NVP, *z* = -0.37) for the same scale reported by Simpson et al.⁴ from their sample of HG patients (mean = 76.4, SD = 14.9), it does not appear that the HG or NVP samples included in this study were atypical.

Elevated psychological and psychiatric symptoms, even on measures of personality, may in fact reflect a reaction to physiological distress, especially with severe nausea and vomiting occurring among HG patients. Past studies reporting HG patients as demonstrating higher levels of psychiatric symptoms than asymptomatic pregnant women failed to consider the possibility that HG patients may not be significantly different from women with normal levels of nausea and vomiting who make up the majority of pregnancy cases. The results of this study suggest that the HG patients and the group of women with normal levels of NVP were quite similar.

Results of the exploratory analysis revealed a notable relationship between acculturation level and quality of life measures specific to the experience of NVP. The findings suggest that women who were primarily Spanish-speaking

TABLE 3. NUMBER OF WOMEN FROM HYPEREMESIS GRAVIDARUM AND NAUSEA AND VOMITING OF PREGNANCY GROUPS WITH CLINICALLY SIGNIFICANT ELEVATIONS ON SELECT MINNESOTA MULTIPHASIC PERSONALITY INVENTORY-2RF SCALES

Scale/subscales	HG group (n = 15)	NVP group (n = 15)
Somatic complaints (general)	7	7
Higher-order scales		
Emotional/internalizing dysfunction	1	2
Thought dysfunction	2	4
Behavioral/externalizing dysfunction	0	1

Scores ≥70 were considered elevations of clinical significance.

TABLE 4. PAIRED *t* TEST RESULTS COMPARING SOMATIC AND PSYCHOLOGICAL VARIABLES BETWEEN HYPEREMESIS GRAVIDARUM AND NAUSEA AND VOMITING OF PREGNANCY GROUPS

Scale/subscales	HG group (n = 15) Mean (SD)	NVP group (n = 15) Mean (SD)	p value	Internal reliability ^a
BDI-II				0.91
Cognitive	8.20 (5.67)	8.07 (7.03)	0.954	0.91
Somatic	10.27 (3.26)	9.20 (4.89)	0.565	0.73
NVPQOL				0.98
Fatigue	3.00 (1.97)	3.42 (1.41)	0.541	0.95
Emotion	3.44 (1.24)	3.73 (1.23)	0.545	0.91
Limitations	3.27 (1.87)	3.87 (1.32)	0.336	0.97

^aCronbach's internal reliability coefficient.

BDI-II, Beck Depression Inventory-II; NVPQOL, Health-Related Quality of Life for Nausea and Vomiting During Pregnancy.

HG patients may have had more emotional distress associated with their condition. There is limited public awareness of the HG condition because of how rarely it occurs. HG patients who are Spanish speakers may be particularly vulnerable to a compromised understanding of their condition because of the scarcity of information available on HG. Information seeking can be further complicated by language barriers that may minimize the amount of information healthcare providers are able to provide. Illness uncertainty, an inability to determine the meaning of illness-related events, has been linked to increased psychological distress.²² Future studies should assess the potential benefits of providing resources aimed at decreasing language barriers, such as translators and Spanish-language educational literature, to Spanish-speaking women with HG to ensure they are adequately informed about their condition, its prognosis, and treatment options, as well as the impact of HG on the health of the mother and fetus.

Although the results of this pilot study challenge the perception of HG patients as being more psychiatrically disturbed than women without HG, several methodological limitations should be noted. First, the sample sizes of each study group were small, therefore limiting the statistical power of the analyses. However, for the scale most often implicated in psychosomatic distress, the MMPI-2 hypochondriasis scale, the effect size for the difference between the HG and NVP groups was small, specifically, $d_z = 0.12$.²³ For a significant difference between groups on hypochondriasis means to be detected, a sample of 539 pairs would have been

needed. This suggests that the difference in group means on hypochondriasis is not clinically meaningful. Moreover, on examining the directionality of mean differences between the HG and NVP groups on MMPI-2 scales, there lacks a consistent trend that would suggest that having had more matched pairs would have resulted in clinically significant differences where one group scored consistently higher than the other group. On the contrary, the HG group had higher mean scores on the hypochondriasis, depression, and hysteria scales, and the NVP group had higher means on scales considered indicative of clinically significant psychiatric symptoms, such as psychopathic deviance, paranoia, schizophrenia, and hypomania. We acknowledge that it is always difficult to disconfirm a hypothesis and to accept the null. It is for this reason that we purposefully did not correct for type I error and included findings of $p \leq 0.10$ or less. We tried to detect tendencies that would lead to the opposite conclusion by taking any results disconfirming the null hypothesis seriously. Even with this approach, however, a consistent pattern failed to emerge that would indicate that women with HG were more psychiatrically disturbed than pregnant women without the diagnosis. On the contrary, all the evidence points in the direction of the null hypothesis. Furthermore, we ran the analyses with all the available and complete MMPI data from the larger study sample ($n = 96$). With the resulting 61 patients, the pattern of results remained consistent with the previous findings. Given that this pilot study demonstrated that it is possible to conduct research with pregnant women

TABLE 5. ANALYSIS OF COVARIANCE RESULTS OF SIGNIFICANT MEAN DIFFERENCES IN HYPEREMESIS GRAVIDARUM, NAUSEA AND VOMITING OF PREGNANCY AND NON-NAUSEA AND VOMITING OF PREGNANCY GROUPS

Scale	HG (n = 15) Mean (SD)	NVP (n = 15) Mean (SD)	Asymptomatic (n = 9) Mean (SD)	F (2,36)	p value
MMPI-2					
Hypochondriasis	72.3 (9.37) _a	70.9 (8.26) _a	60.6 (17.9) _b	3.40	0.044
MMPI-2RF					
Malaise	67.1 (10.7) _a	61.8 (13.7) _a	53.1 (11.8) _b	3.70	0.035
Gastrointestinal complaints	67.5 (19.8) _a	76.0 (16.5) _a	49.8 (11.3) _b	6.78	0.003
NVPQOL					
Fatigue	3.00 (1.97) _a	3.42 (1.41) _a	6.42 (0.48) _b	15.3	<0.001
Emotion	3.44 (1.24) _a	3.73 (1.23) _a	5.86 (0.46) _b	14.8	<0.001
Limitations	3.27 (1.87) _a	3.87 (1.32) _a	6.29 (1.04) _b	11.8	<0.001

Significant differences do not share subscript letters.

with HG, especially those from underrepresented backgrounds, future studies should assess whether these findings are replicable with larger clinical samples.

Other methodological limitations of this pilot study should be noted. The cross-sectional design of this study does not allow for causal interpretations. This study implemented different recruitment strategies for the HG group and the NVP and asymptomatic groups, where HG patients were recruited from hospitals and the NVP and asymptomatic women were self-selected from the community. Although this may have introduced a self-selection bias, this bias would have had to be minimal, given the fact that the NVP and asymptomatic groups were similar to NVP and asymptomatic groups in other studies. Another potential self-selection bias may have resulted from the difficulty in studying patients with severe and debilitating symptoms. It may have been that only those HG patients who were physically up to participating did; however, those who completed the study questionnaire did not differ from those who did not on key variables. Although the level of participation of women with such severe somatic symptoms may be surprising, it further emphasizes the feasibility of research with this severely understudied patient population. The fact that women were financially compensated for their participation could have introduced a selection bias as well. Finally, this study lacked measures of psychosocial resources, such as social support or coping strategies, and information on patients' attitudes about HG and treatment by healthcare staff, all of which could have provided a richer picture of the experiences of HG patients and have useful clinical implications.

Despite these limitations, this study has several strengths. First, this pilot study demonstrated that it is possible to conduct research with women diagnosed with HG, particularly low-income women from ethnic minority backgrounds. Second, we were able to match the women in the HG and NVP groups on a number of key demographic variables, thereby controlling for age, years of education, insurance source, race/ethnicity, and the possible influence of being partnered. Moreover, there were no significant differences between the women included in this pilot study (matched and asymptomatic groups) and the larger study sample across all key variables, suggesting that the study sample is representative of the larger sample. Third, the majority of this sample includes a largely underrepresented patient population, Hispanic women. By using both English and Spanish measures, we were able to include a segment of the patient population that is often excluded based simply on language barriers. This pilot study sheds light on the experiences of Spanish-speaking HG patients and pregnant women with NVP and reveals an area for further research on the needs of this special population, such as increased information. Finally, we have expanded the literature on the psychological factors involved in HG by comparing a patient sample with otherwise healthy pregnant women experiencing normal levels of NVP.

Conclusions

The results of this pilot study suggest that women with HG are no more likely to have increased psychiatric disturbances than pregnant women with mild to moderate levels of NVP. On the contrary, women with HG were similar to pregnant women with normal levels of NVP with respect to personality

and psychological factors. Group differences were primarily relevant to somatic symptoms, with HG patients reporting more severe and frequent somatic complaints. These findings add support to the idea that HG is not only a physiological challenge but a psychosocial one as well. Researchers are encouraged to consider this when designing future, larger studies on the experiences of HG patients. More research is needed to examine the informational needs of non-English-speaking HG patients and assess the benefits of providing opportunities for questions and information gathering, in addition to translation services, for these patients. Additionally, future research should investigate the effectiveness of psychosocial interventions, such as psychological support services (e.g., counseling and psychoeducation) for women with HG or NVP, including consideration of culturally sensitive approaches.

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Disclosure Statement

The authors have no conflicts of interest to report.

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