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Gender differences in health anxiety: An investigation of the interpersonal model of health anxiety

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ABSTRACT

Health anxiety (HA) involves persistent worry about one's health and beliefs one has an illness or may contract a disease. In the present study, gender differences in Noyes et al.'s (2003) interpersonal model of health anxiety (IMHA) were examined. Using a sample of 950 undergraduates (674 women; 276 men), multigroup confirmatory factor analyses suggested the measurement model for key dimensions of the IMHA (i.e., reassurance-seeking, alienation, worry, and absorption) were invariant across gender. This suggests key dimensions of this model are applicable to and generalizable across women and men. Coefficients alpha for and bivariate correlations between these IMHA dimensions were also roughly comparable across women and men. As hypothesized, mean levels of reassurance-seeking and worry were significantly higher in women compared to men. No gender differences were observed in mean levels of alienation or absorption. Reassurance-seeking and worry appear salient in the interpersonal behavior and emotional life of women with HA. The present study helps to clarify gender differences in the IMHA and other HA models involving similar variables.

1. Introduction

Health anxiety (HA) involves persistent worry about one's health and beliefs one has an illness or may contract a disease (Taylor & Asmundson, 2004). Excessive reassurance-seeking, an intense focus on bodily sensations, and a sense of alienation from other people often accompany HA (Longley, Watson, & Noyes, 2005). In the present study, we adopted a dimensional model of HA where HA levels are conceptualized as lying along a continuum from mild to severe. Our use of a dimensional model is consistent with research suggesting HA is a continuous, quantitative dimension rather than a discrete, qualitative category (Ruscio & Kaczetow, 2009). We also studied a relatively unselected sample of undergraduates whose HA levels may be conceptualized as lying, on average, at the mild end of the HA continuum. Research on such symptoms is needed, as mild levels of HA are a risk factor for severe levels of HA (Taylor & Asmundson, 2004). The study of mild levels of HA may therefore help to clarify the origins of severe forms of HA (e.g., *DSM-IV* hypochondriasis). Mild levels of HA are also tied to problems such as missing school, healthcare overuse, psychiatric comorbidity, and strained relationships (Hadjistavropoulos & Lawrence, 2007). There is thus a need to increase our understanding of mild levels of HA (which we refer to as HA). In particular, researchers have called for studies explicating interpersonal factors in HA (Noyes et al., 2003), as empirical work in this area is only just emerging.

1.1. Interpersonal model of health anxiety (IMHA)

According to the IMHA (Noyes et al., 2003), HA represents a maladaptive expression of attachment insecurity. This model holds that persons with HA were exposed to negative parenting styles and aversive experiences (e.g., illness) which predispose a pattern of attachment insecurity and somatic *absorption* (i.e., a focus on one's bodily sensations). Illness behaviors that typify HA are viewed as an attempt to alleviate attachment insecurity and somatic concerns by eliciting care from others. And *reassurance-seeking* (i.e., seeking care from other people regarding one's perceived health problems) is seen as the main way in which persons with HA attempt to elicit care. However, as persons with HA are insecurely attached, their reassurance-seeking is persistent––even after extensive reassurance is provided.

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As an indirect expression of attachment needs, and a form of interpersonally aversive behavior, reassurance-seeking is also thought to generate conflict with others that leads to *alienation* from others (i.e., believing other people are unconcerned with one's perceived health problems). Such conflict and alienation are believed to confirm and to exacerbate attachment insecurities (e.g., rejection fears) in persons with HA. Feeling alienated from others is also thought to exacerbate *worry* (i.e., anxiety about one's perceived health problems) in persons with HA, with both attachment insecurity and a distressing sense of alienation from others understood as amplifying worry. In attempting to reduce their worry, persons with HA are expected to again seek reassurance from others and a vicious cycle of reassurance-seeking, alienation, and worry is repeated amid an already chronic pattern of absorption (Noyes et al., 2003).

To summarize, the IMHA asserts that the insecure attachment and the somatic absorption characteristic of persons with HA lead them to engage in a vicious cycle of reassurance-seeking that results in alienation and that leads to worry. Although initial tests of the IMHA are generally promising (Noyes et al., 2003), not all studies are clearly supportive of this model (Fortenberry & Wiebe, 2007), and additional research is needed to better understand the IMHA. For instance, there is much to learn about the role of gender in the IMHA.

In the present study, we start to fill this gap in knowledge. We use Longley et al.'s (2005) multidimensional inventory of hypochondriacal traits (MIHT) to investigate gender in relation to several key dimensions of the IMHA (i.e., reassurance-seeking, alienation, worry, and absorption). Whereas alienation has generally received less attention in HA research, reassurance-seeking, worry, and absorption play a central role in other HA models, including the cognitive-behavioral model (e.g., Taylor & Asmundson, 2004). The present study thus sheds light on gender differences in the IMHA and other HA models.

1.2. Limitations of existing studies

Despite a longstanding tradition of research on gender differences in HA, this literature remains equivocal. For example, research on gender differences suggests there are higher levels of HA in women (Marcus & Church, 2003), higher levels of HA in men (Applegate et al., 2005), or equal levels of HA across gender (Noyes, Stuart, Longley, Langbehn, & Happel, 2002). When extreme levels of HA are studied as diagnostic categories (e.g., *DSM-IV* hypochondriasis), an equivocal pattern of gender differences and similarities is also observed (Creed & Barsky, 2004).

Such equivocal findings may arise from limitations of existing studies, several of which we address in the present research. For instance, using only global measures of HA, and collapsing across subscales (Marcus & Church, 2003), may obscure gender differences occurring at the subscale level. Comparing mean levels, or other values, before establishing the invariance of the underlying factor structure may also generate inaccurate conclusions (Vandenberg & Lance, 2000). Researchers typically compare women and men on a HA measure without first establishing the invariance of the underlying factor structure across gender (Applegate et al., 2005). This approach leaves basic questions unanswered. For example, are the number of factors and the pattern of factor loadings in a HA measure equivalent in women and men? Little is also known about interpersonal factors in HA (e.g., reassurance-seeking), even though such factors are regarded as important in HA (Noyes et al., 2003), making the present research a contribution to an understudied area. Most studies on gender differences in HA are also atheroetical. Without a theoretical rationale guiding research, investigation into gender differences in HA is unlikely to incrementally advance knowledge. Moreover, provision of gender-sensitive clinical services for HA depends on a clear understanding of gender differences in models and measures of HA. Though clinicians are encouraged to tailor HA treatments (Taylor & Asmundson, 2004) in accordance with unique patient attributes (e.g., gender), evidence is needed to inform gender-sensitive assessment, case conceptualization, and treatment.

1.3. Conceptualizing gender differences in the IMHA

Theory and evidence converge to suggest higher levels of reassurance-seeking in women vs. men. Compared to men, evidence indicates women have wider social networks, more communal (as opposed to agentic) traits, and more interdependent self-construals (Feingold, 1994). Such factors may set conditions for reassurance-seeking behaviors in women. Men and women may also be socialized to act according to gender roles: Women are encouraged to express their feelings and to seek social support, whereas men are encouraged to deal with stressors independently and instrumentally (Tamres, Janicki, & Helgeson, 2002). As a behavior counter to such gender roles, reassurance-seeking in men may not be well-received and may result in negative outcomes (e.g., rejection; Joiner, Alfano, & Metalsky, 1992). Overall, several factors appear to incline women to seek more (and/or men to seek less) reassurance.

Research on gender differences in worry is scarce. With little direct evidence available, we examined literature on gender differences in similar constructs such as general forms of worry (e.g., the excessive worry characteristic of those with generalized anxiety disorder). This research indicated women are higher in general forms of worry than men (Ginsberg, 2004). Various factors are believed to contribute to this gender difference, including biological factors (e.g., fluctuations in reproductive hormones in women), socio-cultural factors (e.g., socialization processes encouraging worry in women), personality factors (e.g., elevations in anxiety sensitivity in women), and cognitive factors (e.g., a greater propensity toward repetitive thoughts in women; Ginsberg, 2004). Such evidence, though indirect, suggests women may experience more worry than men.

There is, in particular, a scarcity of theory and evidence on gender differences in alienation and absorption. And what little indirect evidence is available on gender differences in alienation-related constructs (e.g., social isolation) or absorption-related constructs (e.g., bodily awareness) does not appear to support a conclusive statement regarding differences between women and men (Kolk, Hanewald, Schagen, & van Wijk, 2002).

1.4. Objectives and hypotheses

Our objective is to study the role of gender in several key dimensions of the IMHA. It is unclear if the factor structure for these variables (see Fig. 1) is invariant across women and men, as this possibility has yet to be tested. Thus we first tested if the factor structure for these four variables is invariant across gender. Such tests are important to understanding the generalizability of the IMHA (e.g., does the IMHA apply to women and to men alike?) and the clinical utility of the MIHT (e.g., is the MIHT a valid assessment device in both genders?).

Assuming a pattern of measurement invariance was observed, we also planned to test if women and men were comparable in terms of coefficients alpha for, bivariate correlations between, and mean levels of IMHA dimensions and global HA (i.e., the sum of reassurance-seeking, alienation, worry, and absorption). Alphas, correlations, and means are basic statistics with important consequences in research and clinical settings (e.g., unreliable measures

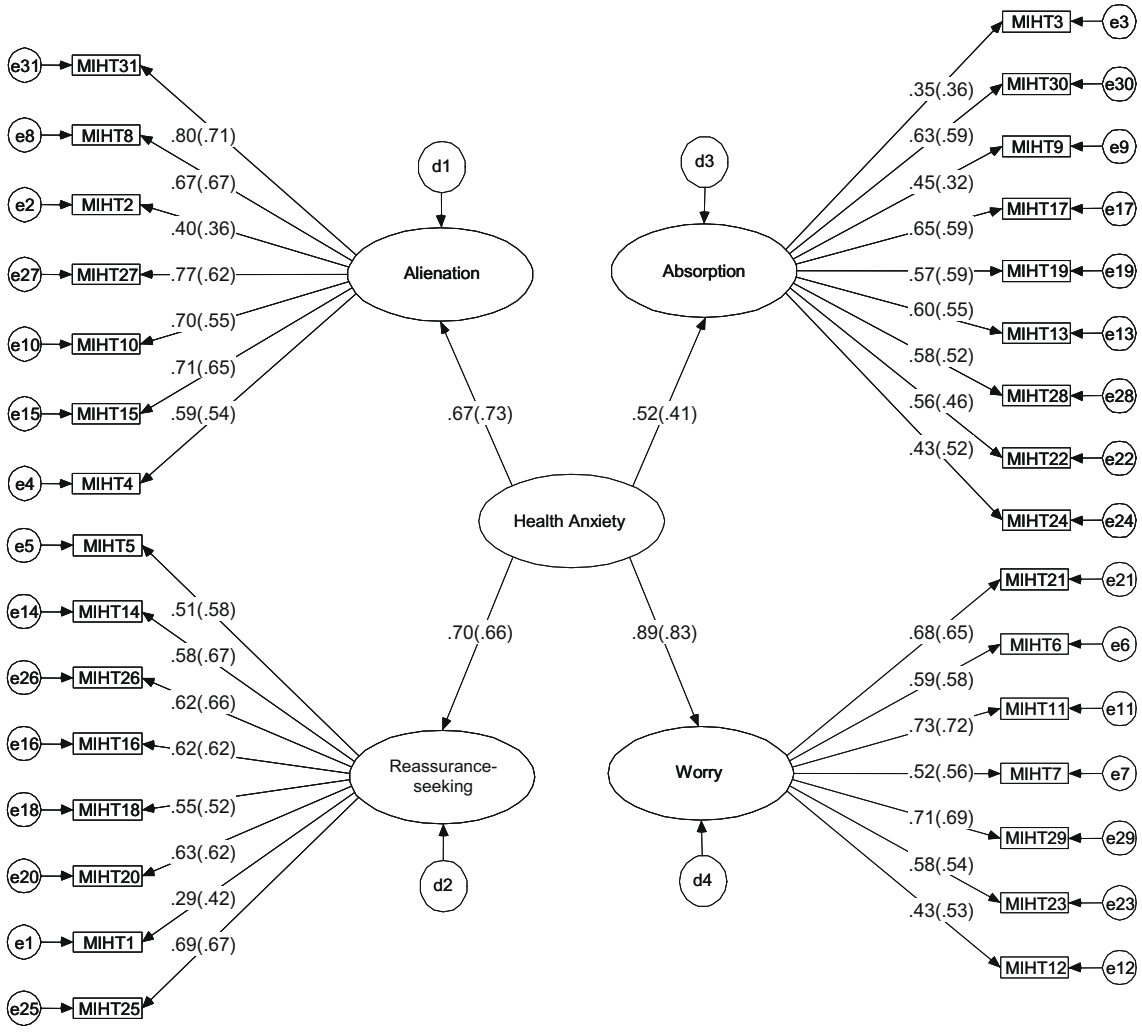

Fig. 1. The second-order factor structure for the MIHT. Ovals represent latent variables; rectangles represent observed indicators. Factor loadings for women are outside parentheses; factor loadings for men are inside parentheses.

may generate inaccurate results). It is important to understand the impact of gender on these basic statistics (e.g., Is the MIHT reliable in women, but unreliable in men?) to help ensure reliable, valid, and generalizable conclusions are reached in empirical studies and clinical practice.

We did not speculate if the factor structure for these four variables was invariant across gender, as there was too little evidence to inform a prediction. Comparisons of coefficients alpha, bivariate correlations, and mean levels of alienation, absorption, and global HA were also considered exploratory, as there is presently not enough research upon which to base specific predictions. However, drawing on literature reviewed above, we hypothesized women would report significantly higher levels of reassurance-seeking and worry than men.

2. Method

2.1. Participants

Participants were 950 undergraduate psychology students (674 women; 276 men) with a mean age of 18.98 years ($SD = 2.39$). There were no significant differences in age across men and women, $F(1, 948) = 0.52$, $p > .10$. No other demographics were collected; no exclusion criteria were used.

2.2. Measures

Multidimensional inventory of hypochondriacal traits (Longley et al., 2005). The MIHT is a 31-item self-report scale involving four subscales measuring HA: reassurance-seeking (8 items), alienation (7 items), worry (7 items), and absorption (9 items). Participants respond to the MIHT on a scale ranging from 1 (strongly disagree/definitely false) to 5 (strongly agree/definitely true). Higher scores signify higher levels. Coefficients alpha for MIHT subscales are usually $\geqslant .75$ (Stewart, Sherry, Watt, Grant, & Hadjistavropoulos, 2008). Evidence supports the predictive, incremental, and convergent validity of the MIHT (Longley et al., 2005).

2.3. Procedure

Participants completed the MIHT during a mass screening survey conducted in conjunction with introductory psychology classes at St. Francis Xavier University ($n = 535$) and at Dalhousie University ($n = 415$). St. Francis Xavier University is a rural, publicly-

funded university and Dalhousie University is an urban, publicly-funded university. Participation was anonymous and voluntary.

3. Results

3.1. Multigroup analysis

Mardia's normalized estimate of multivariate kurtosis suggested there was significant nonnormality in the data. Inspection of individual kurtoses suggested heterogeneous kurtosis was present. Failing to address such kurtosis may result in inaccurate estimates. Recommendations for analyzing data with heterogeneous kurtosis were therefore followed and the geometric mean approach to heterogeneous kurtosis estimation was used (Bentler, 2005).

Evidence suggests the MIHT factor structure may be optimally represented by a second-order factor structure involving four lower-order factors loading into a single higher-order factor (Stewart et al., 2008). Multigroup confirmatory factor analyses tested if factor loadings for the second-order factor structure of the MIHT varied across gender. This factor structure (see Fig. 1) represents the measurement model for four key dimensions of the IMHA. A root mean square error of approximation (RMSEA) in the range of .05–.08 and a comparative fit index (CFI) and an incremental fit index (IFI) in the range of .95 suggest a well-fitting model (Byrne, 2006).

3.1.1. Baseline models

Identification of a well-fitting baseline model is seen as a prerequisite for tests of configural and metric invariance (Byrne, 2006). As Table 1 illustrates, a baseline model for the second-order factor structure of the MIHT was estimated for women (see Model 1) and for men (see Model 2). This factor structure fit the data well in both groups.

First-order and second-order standardized factor loadings were substantial and significant ($p < .001$; see Fig. 1). For women, first-order factor loadings ranged from .29 to .80, whereas second-order factor loadings ranged from .52 to .89. For men, first-order factor loadings ranged from .32 to .72, whereas second-order factor loadings ranged from .41 to .83. Overall, confirmatory factor analyses suggested the measurement model for the IMHA was acceptable.

3.1.2. Configural invariance

A configural invariance model (see Model 3 in Table 1) examined if the number of factors and the pattern of factor loadings in Fig. 1 were invariant across gender (Byrne, 2006). This model was well-supported, suggesting the items of the MIHT represent the same conceptual framework (see Fig. 1) across women and men. This model also provided a benchmark against which to compare subsequent invariance models.

Table 2
Coefficients alpha and bivariate correlations.

Variables	1	2	3	4	5	α
1. Health anxiety	–	.75*	.73*	.80*	.64*	.89
2. Reassurance-seeking	.76*	–	.37*	.48*	.30*	.79
3. Alienation	.71*	.40*	–	.53*	.25*	.84
4. Worry	.79*	.48*	.50*	–	.32*	.79
5. Absorption	.59*	.21*	.22*	.25*	–	.79
α	.87	.81	.78	.80	.76	–

Note: Statistics for women are above the diagonal; statistics for men are below the diagonal.
* $p < .001$.

3.1.3. Metric invariance

Two metric invariance models were estimated: Model 4 in Table 1 tested if first-order factor loadings (see Fig. 1) were invariant across gender and Model 5 in Table 1 tested if second-order factor loadings (see Fig. 1) were invariant across gender. Factor loadings were considered invariant if the metric invariance model was well-fitting and there was no decrease in fit relative to the configural invariance model as measured by a $\Delta CFI \leqslant 0.01$ (see (Cheung & Rensvold, 2002).

Fit indices and ΔCFI values indicated first-order and second-order factor loadings were invariant across gender. Such a pattern of measurement invariance may be seen as a precondition for our subsequent comparisons of coefficients alpha, bivariate correlations, and mean levels across gender (Vandenberg & Lance, 2000). Without a pattern of measurement invariance, observed gender differences may represent methodological artifacts (e.g., differences arising from a factor structure that varies across gender) rather than meaningful gender differences.

3.2. Coefficients alpha

Coefficients alpha appear in Table 2 for both groups. All scales showed adequate reliability (i.e., $\alpha s > .75$). Coefficients alpha for the MIHT were also compared across gender. Using Feldt's (1969) formula for comparing coefficients alpha, one difference was found: The coefficient alpha for the alienation subscale was higher in women than men, $W = 1.37$, $p < .001$.

3.3. Bivariate correlations

Interpersonal model of health anxiety dimensions were significantly correlated in women and men, with correlations involving absorption being smaller in magnitude (see Table 2). IMHA dimensions and global HA were significantly correlated in both groups. Statistical comparisons of correlations were also conducted (Cohen, Cohen, West, & Aiken, 2003). These comparisons showed no statistically significant differences between women and men in terms of the magnitude of the correlations among IMHA dimensions. For example, the correlation between reassurance-seeking

Table 1
Goodness-of-fit statistics and model change statistics for tests of the measurement invariance of the MIHT.

Model number	Model description	Goodness-of-fit statistics						Model change statistics	
		χ^2	*df*	CFI	IFI	RMSEA	RMSEA 90% CI	Model comparison	ΔCFI
1	Women (baseline)	1397.40	430	.951	.951	.058	.054–.061	–	–
2	Men (baseline)	991.71	430	.925	.925	.069	.063–.074	–	–
3	Configural invariance	2389.11	860	.944	.944	.061	.058–.064	–	–
4	First-order factor loading invariance	3375.17	887	.953	.953	.056	.053–.059	3 vs. 4	.009
5	Second-order factor loading invariance	2790.92	891	.941	.941	.062	.059–.065	3 vs. 5	−.003

Note: CI, confidence interval.

Table 3
Means, standard deviations, analyses of variance, and effect sizes.

Variable	Women		Men		F (df = 1, 948)	η^2
	M	*SD*	*M*	*SD*		
Health anxiety	93.72	15.29	87.80	15.26	29.36*	.03
Reassurance-seeking	26.46	5.43	22.68	5.99	89.17*	.09
Alienation	16.58	4.91	16.44	4.52	0.18	.00
Worry	18.38	5.42	16.61	5.54	20.62*	.02
Absorption	32.30	5.18	32.08	5.32	0.36	.00

Note: η^2 (i.e., partial eta squared) is a measure of effect size that is comparable to a R^2 value.
* $p < .001$.

and alienation in women (r = .40) was not significantly different in magnitude ($z = -0.49$, $p > .05$) than the correlation between reassurance-seeking and alienation in men (r = .37).

3.4. Analysis of variance (ANOVA)

Observed means (rather than latent means) are analyzed as the MIHT is a new scale and there is a paucity of observed means available for research purposes (e.g., norms). One-way ANOVAs tested if women had significantly different levels of IMHA dimensions and global HA compared to men. As hypothesized, women reported significantly higher levels of reassurance-seeking and worry relative to men (see Table 3). Women also reported significantly higher levels of global HA. No other significant gender differences were found.

4. Discussion

The present study provided novel evidence regarding the role of gender in several key dimensions of the IMHA. The measurement model for these dimensions fit the data well and displayed configural and metric invariance across gender, thus providing a sound psychometric foundation on which to base our subsequent gender comparisons. Coefficient alphas for and bivariate correlations between these dimensions were also generally comparable across gender. As hypothesized, women appeared significantly more likely to engage in reassurance-seeking and worry compared to men. Mean levels of global HA were also higher in women than men, and no gender differences were observed in mean levels of alienation or absorption.

4.1. Gender differences in the measurement model for the IMHA

Earlier studies of gender differences in HA failed to first examine if there is a pattern of configural and metric invariance between women and men. It is thus unclear if observed gender differences or similarities in the HA literature represent methodological artifacts or true reported differences. Rather than assuming the measurement model for the IMHA was invariant across gender, we empirically tested this assumption and found the number of factors, the pattern of factor loadings, and the magnitude of factor loadings in Fig. 1 are invariant across gender. Thus, the measurement model for the IMHA appears applicable to and generalizable across the women and the men studied. To our knowledge, the present study is the first to test if and to show that women and men are similar in terms of the basic structure of HA. This finding lends credence to etiologic and treatment models of HA (e.g., Noyes et al., 2003), which have typically assumed that (but not tested that) HA dimensions are comparable across gender.

4.2. Gender differences in coefficients alpha, bivariate correlations, and mean levels

4.2.1. Coefficients alpha for IMHA dimensions

Coefficients alpha were reasonably high in and roughly equivalent across women and men. This finding is notable as coefficients alpha do not automatically generalize from one group (women) to another group (men). All coefficients alpha were >.75, suggesting the items of a given MIHT subscale adequately cohere together with a relatively small amount of measurement error. Our study thus joins Longley et al. (2005) and Stewart et al. (2008) in suggesting the MIHT subscales display adequate internal consistency.

No gender differences in coefficients alpha were found, except for the alienation subscale. Items measuring alienation showed significantly higher internal consistency in women (α = .84) vs. men (α = .78). This suggests items measuring alienation relate together more cohesively, and with less measurement error, in women. It may be that women and men understand alienation in a somewhat different manner. We also suggest caution in interpreting this finding, as the coefficient alpha for alienation was acceptable in both women and men.

4.2.2. Bivariate correlations between IMHA dimensions

As in Stewart et al. (2008), moderate to strong correlations were found between (a) IMHA dimensions and (b) IMHA dimensions and global HA. These findings suggest reassurance-seeking, alienation, worry, and absorption are interrelated, but distinct, dimensions as represented by the measurement model for the IMHA. Furthermore, no significant gender differences were found when comparisons of correlation magnitudes were conducted, suggesting relations among reassurance-seeking, alienation, worry, and absorption are equally strong across gender. The pattern of intercorrelation in Table 2 also broadly supports the IMHA, insofar as this model postulates reassurance-seeking, alienation, worry, and absorption is positively and significantly associated.

Much like Stewart et al. (2008), second-order factor loadings and bivariate correlations involving absorption were smaller in magnitude for both gender groups. This finding is consistent with the less prominent role accorded absorption in the IMHA (Noyes et al., 2003). Absorption may also offer a suboptimal representation of the attentional/perceptual dimension of HA. Whereas absorption items measure the degree to which a respondent is focused on bodily sensations, it is possible the attentional/perceptual dimension of HA is better conceptualized in terms of fear over or catastrophizing about bodily sensations (Taylor & Asmundson, 2004). That said, our study still suggests a potential role for absorption in the IMHA for women and men. Our results also link the IMHA to other HA models that include an absorption-like dimension (Taylor & Asmundson, 2004).

4.2.3. Mean levels of IMHA dimensions

Women had significantly higher mean levels of global HA compared to men. Although research on gender differences in global HA is equivocal (Creed & Barsky, 2004), to our knowledge extant studies have yet to consider gender differences vis-à-vis a predominantly interpersonal model and measure of HA. Perhaps more robust gender differences appear when HA is studied from an interpersonal standpoint. As global HA involves a combination of four IMHA dimensions, it is also possible gender differences in global HA are attributable to gender differences in reassurance-seeking and worry. We suggest MIHT subscales should be combined with caution, as doing so may obscure nuanced differences.

As hypothesized, significantly higher mean levels of reassurance-seeking were found in women than men. Women appear more likely to involve others in their perceived health problems by seeking out reassurance, which complements evidence suggest-

ing women are more likely than men to express their emotions and to involve others in their coping efforts (Tamres et al., 2002). In contrast, men may make greater use of independent and/or instrumental coping behaviors in response to perceived health problems (Tamres et al., 2002). Men and women may also be treated differently by others, with women receiving more (or men receiving less) encouragement for seeking social support. Overall, our research suggests there is a theoretically appreciable gender difference in reassurance-seeking, an interpersonal behavior seen as central to maintaining HA in the IMHA and other HA models (Taylor & Asmundson, 2004).

Women also had significantly higher mean levels of worry relative to men, thereby supporting our hypothesis. This finding is consistent with research suggesting women are higher in other forms of worry than men (e.g., worry about physical sensations; Ginsberg, 2004). Through gender role socialization women (vs. men) may learn it is more acceptable to experience and express worry or to adopt sick role behavior (Ginsberg, 2004). Expressed in terms of the IMHA, increased worry in women may also contribute to increased reassurance-seeking, with reassurance-seeking representing interpersonal coping behavior aimed at alleviating worry.

Congruent with past research (Kolk et al., 2002), no gender differences in mean levels of alienation and absorption were found. Considered in relation to the IMHA, this suggests women are more likely than men to worry and to seek reassurance in an effort to alleviate this worry, but women are no more likely than men to focus on bodily sensations or to feel alienated with respect to their health concerns. Although men appear to engage in less reassurance-seeking than women, when men do seek reassurance from others they may encounter more negative responses and end up feeling as alienated as women (Joiner et al., 1992).

4.3. Present limitations and future directions

Our data come from a mass screening survey of young undergraduates taking psychology classes. This method restricted both the demographics collected and the severity of the HA studied. It is also unclear if the present results generalize to other populations. Moreover, it is unknown if participants had medical problems, severe health anxiety (e.g., *DSM-IV* hypochondriasis), or other psychiatric conditions that might influence the present results. Future studies might examine the measurement invariance of the IMHA across other demographic variables (e.g., ethnicity) or levels of HA severity (e.g., students vs. patients). Another area for future research is absorption. In seeking to better understand absorption-like attentional/perceptual biases in the IMHA, other measures of such information processing biases might be used (e.g., an HA-related Stroop task; see Karademas, Christopoulou, Dimostheni, & Pavlu, 2008).

4.4. Overall conclusions

The present study supported the IMHA, a recently proposed model of HA. Results suggested the measurement model for the IMHA is applicable to and generalizable across women and men. Comparisons of mean levels also suggested women are more likely to engage in reassurance-seeking and worry than men. Reassurance-seeking and worry thus appear salient in the interpersonal behavior and emotional life of women with HA. These findings may be used to inform gender-sensitive models of and treatments for HA.

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