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Cognitive Processing and Acrophobia: Validating the Heights Interpretation Questionnaire

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Abstract

Three studies were conducted to examine the psychometric properties of a new scale: the Heights Interpretation Questionnaire (HIQ). This scale was designed to measure height fear-relevant interpretation bias to help assess the relationship between biased interpretations and acrophobia symptoms. Studies 1 ($N = 553$) and 2 ($N = 308$) established the scale's factor structure and convergent and discriminant validity among two large undergraduate samples. Study 3 ($N = 48$) evaluated the predictive validity of the HIQ by examining how well the scale predicted subjective distress and avoidance on actual heights. Factor analysis resulted in four distinct factors, and results suggest that each of the factors, along with the full HIQ, have good reliability and validity. Additionally, the scale predicts subjective distress and avoidance on heights beyond self-reported acrophobia symptoms. Overall, the HIQ shows promise as a new tool to investigate cognitive processing biases in acrophobia.

Keywords

acrophobia; interpretation; height fear; scale validation

There is evidence that acrophobic individuals have biases in interpretation and judgment such that they tend to overestimate danger and doubt their ability to cope with anxiety in height-relevant situations (e.g., Menzies & Clark, 1995). However, there are no published measures (to our knowledge) that assess height-relevant interpretation biases in a standardized way. Given that biased interpretations are a critical component of cognitive models of anxiety (e.g., Beck & Clark, 1997) and treatment of anxiety disorders (e.g., Barlow, 2002), a simple way to measure height-relevant interpretation biases would provide a useful research and clinical tool. In this article, we report on a series of studies evaluating the factor structure, reliability and validity of a new scale: the Heights Interpretation Questionnaire (HIQ).

Lack of height-relevant interpretation bias questionnaires is surprising, given the centrality of biased interpretations in cognitive models of anxiety. These models posit that a maladaptive schema leads to biases in the ways fearful individuals interpret, attend to, and remember information, such that threatening information is kept salient, which increases anxiety and promotes avoidance (Beck & Clark, 1997; Williams, Watts, MacLeod, &

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Mathews, 1997). Moreover, cognitive-behavioral therapy and cognitive therapy for anxiety both have a strong emphasis on changing interpretations (e.g., Barlow, 2002). In fact, Beck and Clark state that “it is the propensity of this information processing apparatus to inappropriately generate threat meaning assignments to innocuous stimuli that is the main problem that must be rectified in the treatment of anxiety disorders” (p. 51). This is important even in exposure-based therapies, in which one of the desired outcomes of interacting with the feared object is the chance to disconfirm feared expectations and learn to make less threatening interpretations of the situation (e.g., Teachman & Smith-Janik, 2005). Therefore, a simple assessment of interpretations can be useful for both research purposes and for clinical practice to evaluate progress in treatment.

Although we know of no published questionnaires measuring height-relevant interpretation biases, a small number of studies have used height-relevant anxiety provocations (e.g., climbing ladders, looking over balcony railings) as a method of evaluating individuals’ anticipatory and on-line judgments of physical danger and ability to cope with anxiety (Clerkin, Cody, Steffanucci, Proffitt, & Teachman, 2009; Menzies & Clark, 1995; Teachman, Stefanucci, Clerkin, Cody, & Proffitt, 2008). For instance, when anticipating climbing a ladder, acrophobic individuals gave higher estimates of the probability of falling from the ladder and gave higher estimates of the injuries that would result from falling (compared to non-fearful control participants; Menzies & Clark, 1995). Additionally, when asked to stand on a balcony, height-fearful individuals more strongly endorsed experiencing thoughts related to danger (e.g., “The railing will not protect me”) and their inability to cope with anxiety (“I will be paralyzed by fear”), compared to low fear participants (Clerkin et al., 2009; Teachman et al., 2008). Together, these results provide evidence, consistent with cognitive models, that when confronted with an actual height, height fearful individuals interpret the height to be dangerous and doubt their ability to cope.

Similarly, Williams and Watson (1985) asked acrophobic individuals to provide ratings of perceived danger and ratings of self-efficacy (e.g., confidence in their ability to climb stairs) while anticipating a behavioral test involving climbing and looking over the railings of progressively higher balconies. Instead of comparing acrophobic individuals’ ratings to those of a control group, the authors evaluated how well the acrophobic individuals’ ratings predicted actual behavior while on a height. Ratings of self-efficacy (and ratings of perceived danger, to a lesser extent) predicted avoidance during the behavioral task.

The current study builds on this research by validating a questionnaire that can be used to evaluate the relationship between height fear and interpretation biases without the need for a height-relevant anxiety provocation. In this way, the measure can be used across settings without the need for equipment or a special environment, and the measure can also be used for screening purposes. By examining a broad range of interpretations (including those related to perceived danger, physical consequences of anxiety, and emotional consequences of anxiety), the HIQ aims to provide a multi-faceted measure of height-relevant interpretation bias. Additionally, unlike past studies that compare relatively small groups of height fearful to non-height fearful individuals, the current study uses multiple large samples with a continuous range of height fear to permit a more comprehensive examination of the psychometric properties of the HIQ (e.g., this design allows for examination of the factor structure of the measure in addition to other standard measures of reliability and validity).

The HIQ asks individuals to read and imagine themselves in height-relevant scenarios and then rate the likelihood of interpretations related to each scenario. In Study 1, we determine the factor structure of the HIQ and examine the psychometric properties of the scale in terms of its relationship to acrophobic and other symptom domains. Study 2 attempts to reproduce the factor structure found in Study 1 and replicate the findings for convergent and

discriminant validity. Study 3 evaluates the predictive validity of the HIQ by examining how well the scale predicts emotional vulnerability on actual heights. Additionally, Study 3 includes a highly fearful sample. Based on the prior research demonstrating biases associated with acrophobia (e.g., Menzies & Clark, 1995), we expect the factor analyses in studies 1 and 2 to reveal factors related to dangerousness of being on a height (e.g., falling), physical consequences of anxiety (e.g., fainting), and emotional consequences of anxiety (e.g., fears of not being able to cope). Regarding psychometric properties, we predict the HIQ will have strong reliability based on inter-item consistency, and good convergent, discriminant, incremental, and predictive validity across studies.

Study 1

Method

Participants—Participants included 553 undergraduate students (70.1% female) enrolled in a large public university's psychology department participant pool. The mean age was 18.46 years ($SD = .94$, range = 16 – 25). The reported ethnicity of the sample was Caucasian (74.7%), African American (5.4%), Hispanic (5.8%), Asian (18.1%), Middle Eastern (2.4%), Native Hawaiian/Pacific Islander (.7%), and multiple ethnicities (8.7%).¹

Materials—The Heights Interpretation Questionnaire (HIQ; see appendix) is a 16-item self-report questionnaire designed to measure height-relevant interpretations. It is modified from the Spider Interpretation Questionnaire (SIQ; de Jong & Muris, 2002)². In the HIQ, participants are asked to read and imagine themselves in two height-relevant scenarios (climbing a ladder and standing on a balcony - common fears for height phobic individuals; Antony, Craske, & Barlow, 2006) that are designed to be somewhat ambiguous in terms of how dangerous the heights are, and whether or not the individual will be able to cope with his/her anxiety. Next, participants rate the likelihood on a scale of 1 (*not likely*) to 5 (*very likely*) of eight interpretations related to each scenario (e.g., “You will fall”).

The Acrophobia Questionnaire-Anxiety Subscale (AQ-Anxiety; Cohen, 1977) is a 20-item self-report questionnaire that asks participants to rate their anxiety related to height-relevant situations (e.g., “Riding a Ferris wheel”) using a 0 (*not at all anxious; calm and relaxed*) to 6 (*extremely anxious*) scale. The AQ-Anxiety is a widely used measure of height fear and has good psychometric properties (Baker, Cohen, & Saunders, 1973).

The Depression Scale of the Depression Anxiety Stress Scales short form (DASS21-DS; Lovibond & Lovibond, 1995) is a self-report questionnaire measure of depressive symptoms that asks participants to rate how much seven statements tied to depressive symptoms (e.g., “I felt down-hearted and blue”) applied to them over the past week on a scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). The DASS21-DS has adequate psychometric properties (Antony, Bieling, Cox, Enns, & Swinson, 1998) and was used to examine discriminant validity of the HIQ based on the expectation that the HIQ should relate more strongly to a measure of acrophobia symptoms (AQ-Anxiety), relative to a clinical problem that is not focused on fear and anxiety, like depression.

Procedure—Participants completed the HIQ, AQ-Anxiety, and DASS21-DS as part of a larger battery of questionnaires through the university's psychology department participant

¹For studies 1 and 2, participants were given the option of selecting more than one ethnicity, so summed ethnicities exceed 100%.

²In the SIQ, participants read short vignettes and rated the probability of various events occurring (e.g., “a spider will attack you”). The SIQ was designed to have four subscales: harm, contact, approach, and territory. The SIQ and its four subscales have adequate reliability and validity (de Jong & Muris).

pool. The questionnaires were completed online and in random order, and participants were unaware these particular measures would be analyzed together.

Results

Descriptive statistics—HIQ scores ranged from 18 – 70 with a mean of 31.44 ($SD = 9.33$). As expected, AQ-Anxiety ($M = 24.77$, $SD = 17.68$, range = 0 – 97) and DASS21-DS ($M = 8.00$, $SD = 7.27$, range = 0 – 42) scores were comparable to those found in previous studies using student (Cohen, 1972) and non-clinical (Henry & Crawford, 2005) samples.

Factor structure—To determine the factor structure of the HIQ, an exploratory principal components analysis was conducted. To examine the unique components of heights interpretation bias, and to increase interpretability of factors, varimax rotation was used. Examination of the scree plot yielded a 4-factor solution that accounted for 66.91% of the total variance³. Factor loadings ranged from .32 to .83, with an average loading of .70 ($SD = .15$). Following Tabachnick and Fidell's (2001) recommendation to use .32 as the minimum loading required for interpreting items (assuming the loading on a factor is theoretically consistent), all items were retained. Items were assigned to factors based on highest loadings, except for two items that were assigned to factors based on theoretical considerations (see Table 1). Because the difference between these two items' highest loadings and the loadings used to assign them to factors was relatively small (the average was .21), and because the reallocation of the two items increased the conceptual clarity of the factors, both were retained and assigned based on theoretical considerations. Four items were assigned to each factor.

The predicted dangerousness of heights factor emerged as two separate factors reflecting the two different scenarios in the HIQ: dangerousness of being on a balcony (Factor I, accounting for 24.35% of total variance) and dangerousness of climbing a ladder (Factor II, accounting for 17.91% of total variance). As expected, the analysis also resulted in factors reflecting concerns about the physical consequences of anxiety (Factor III; accounting for 13.9% of total variance) and the emotional consequences of anxiety (Factor IV; accounting for 11.25% of the variance). Correlations among the four factors ranged from $r = .37$ to $.56$ (all $p < .001$).

Reliability analyses: Inter-item consistency—Cronbach's alpha for the full HIQ scale was .87, while Cronbach's alpha for the four factors ranged from .68 to .87, suggesting adequate internal consistency.

Validity analyses: Relationships with other variables—To compare the strength of the relationship between the HIQ and other variables, we conducted a regression predicting HIQ scores from the AQ and the DASS (see Table 2). As expected, both were significant predictors, but the HIQ was more strongly predicted by the heights fear measure than by the depression symptom measure, supporting the HIQ's validity. Notably, a direct comparison of the AQ-HIQ and DASS-HIQ unstandardized regression coefficients using a dependent means t -test showed that the AQ's coefficient was significantly larger than the DASS's coefficient ($t(503) = 3.98$, $p < .001$, $d = .35$). This suggests that the HIQ is more closely related to height fear symptoms than to symptoms in another domain (depression).

³The first five eigenvalues were 6.03, 2.18, 1.47, 1.04, and .89.

Study 2

Study 2 was designed to reproduce the factor structure of the HIQ with a new sample and to replicate the relationship between height-relevant interpretation bias and acrophobia symptoms found in Study 1.

Method

Participants—Similar to Study 1, the university's psychology department participant pool was used to access a large undergraduate sample (308 individuals). The sample was 69% female with a mean age of 19.02 ($SD = 1.16$, range = 17 – 25). Participants reported their ethnicity as Caucasian (71.8%), African American (6.5%), Hispanic (4.2%), Asian (23.1%), Middle Eastern (2.3%), Native Hawaiian/Pacific Islander (2.6%), and multiple ethnicities (8.8%).

Materials and Procedure—The materials and procedure were identical to Study 1.

Results

Descriptive statistics—Similar to Study 1, the mean AQ-Anxiety score was 27.18 ($SD = 20.07$, range = 0 – 111.11) and the mean DASS21-DS score was 9.46 ($SD = 7.95$, range = 0 – 40). As expected, the mean HIQ score was similar to the mean in Study 1 ($M = 32.45$, $SD = 10.27$, range = 18–73).

Factor structure—To reproduce the factor structure of the HIQ found in Study 1, a second principal components analysis with varimax rotation was conducted. As expected, examination of the scree plot led to a 4-factor solution that accounted for 70.46% of the total variance⁴. As in Study 1, items were assigned to the factors they loaded on the highest (except for the same two items from Study 1; see Table 1). As in Study 1, these two items were retained to increase conceptual clarity and because the difference between these items' highest loadings and the loadings used to assign them to factors was small (average was .19). Factor loadings ranged from .39 to .83, with an average loading of .70 ($SD = .15$).

As expected, the four factors were the same as those found in Study 1: a dangerousness of being on a balcony factor (Factor I, accounting for 23.91% of total variance), a dangerousness of climbing a ladder factor (Factor II, accounting for 20.69% of total variance), a physical consequences of anxiety factor (Factor III; accounting for 13.44% of total variance), and an emotional consequences of anxiety factor (Factor IV; accounting for 12.42% of the variance). Correlations among the four factors ranged from $r = .39$ to $.64$ (all $p < .001$).

Reliability analyses: Inter-item consistency—Cronbach's alpha for the full scale was .89, while Cronbach's alpha for the four factors ranged from .71 to .86, replicating the adequate internal consistency found in Study 1.

Validity analyses: Relationships with other variables—Once again, we predicted HIQ scores from the AQ and the DASS (see Table 2) and compared the strength of the unstandardized regression coefficients. As in Study 1, the AQ's coefficient was significantly larger than the DASS's coefficient ($t(304) = 2.72$, $p < .01$, $d = .31$).

⁴The first five eigenvalues were 6.33, 2.45, 1.48, 1.01, and .84.

Study 3

Study 3 evaluates the predictive validity of the HIQ by examining how well the scale predicts subjective fear, avoidance, and anxiety-relevant cognitions and bodily sensations while on actual heights in a sample with a wide range of height fear levels.

Method

Participants—To ensure a broad range of height fear levels, two recruitment strategies were used. For individuals with low to medium levels of height fear, we recruited undergraduate students through a large public university's psychology department participant pool, based on their responses to the Acrophobia Questionnaire-Anxiety subscale (AQ-Anxiety; Cohen, 1977). Individuals who scored in the bottom two thirds of AQ-Anxiety scores were invited to participate.

To ensure that our sample also included some highly fearful and phobic participants, both undergraduate students scoring highly on the AQ-Anxiety via the psychology department participant pool and community members responding to flyers and newspaper advertisements seeking height fearful individuals were selected. To be considered for inclusion in the high height fear group, individuals had to score at least a 45.45 on the AQ-Anxiety (one standard deviation below the mean of a previous acrophobic sample; Cohen, 1972). Potential participants also completed three additional questions modified from the Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders (4th ed., SCID; First, Spitzer, Gibbon, & Williams, 1994). The three modified SCID questions asked individuals to rate the extent: a) they are more afraid of heights than they should be or than makes sense, b) they go out of their way to avoid heights, and c) their feelings towards heights distress them or get in the way of things they want to do. The items use a 0 (*not at all*) to 6 (*extremely*) scale, and participants had to endorse at least a "2" on one or more of the three questions to be considered for study inclusion. Individuals who met the inclusion criteria were then screened over the phone using the Specific Phobia section of the SCID. Only individuals who fell in the subthreshold or threshold range for all criteria on the SCID were invited to participate⁵.

The final sample of 48 undergraduate students and community members (66.8% female) had a mean age of 24.04 years ($SD = 12.46$, range = 18 – 67). The reported ethnicity of the sample was Caucasian (70.8%), African American (2.1%), Asian (22.9%), multiple ethnicities (2.1%) and other (2.1%).

Materials⁶—The materials were the same as those used in Study 1, along with additional measures designed to evaluate anxious responding while on heights.

Questionnaire measures of anxious responding: The Positive and Negative Affect Schedule-Expanded Form (PANAS-X; Watson & Clark, 1994) is a widely used self-report measure of positive and negative affect based on adjective ratings. The PANAS-X has good reliability and validity (Watson & Clark). Participants are asked to rate the extent that they are experiencing each of the adjectives on a scale of 1 (*very slightly or not at all*) to 5 (*extremely*). In the current study, the 6-item fear subscale (PANAS-FS) was used to evaluate state fear at baseline and while on two heights.

⁵If participants scored in the subthreshold or threshold range for most criteria, but scored in the absent range for the "fear of heights interferes with life or causes marked distress" criterion, they were still invited to participate in the high height fear group.

⁶This study is part of a larger study evaluating the effects of exposure therapy and interpretation bias modification on height fear. Only those measures relevant to the current study are described here. For a complete listing of measures, please contact the first author.

The Agoraphobic Cognitions Questionnaire (ACQ; Chambless, Caputo, Bright, & Gallagher, 1984) measures thoughts related to losing control (e.g., “going crazy”) and physical concerns (e.g., “throwing up”) while in a threatening situation. Participants completed a modified version of the ACQ, which included additional items specifically related to being on a balcony. In the modified ACQ, participants are asked to rate how strongly 17 thoughts occurred to them while on the balcony on a scale of 0 (*not at all*) to 4 (*extremely*). The ACQ’s companion measure, the Body Sensations Questionnaire (BSQ; Chambless et al.), assesses anxiety-related bodily sensations (e.g., “heart palpitations”). The original BSQ asks participants to rate their fear of bodily sensations. Participants completed a modified version of the BSQ, in which they are asked to rate how much they experienced 17 sensations (rather than their fear of the sensations) while on the balcony on a scale of 0 (*none*) to 4 (*very severe*). Both scales have adequate psychometric properties (Chambless et al., 1984) and both modifications have been used in past studies with height fearful samples (e.g., Clerkin et al., 2009; Teachman et al., 2008). In the current study, the ACQ and modified BSQ were completed while on a balcony.

Height exposure tasks: The Height Avoidance Task (HAT) measures the degree of avoidance, and the extent of subjective fear experienced, in response to climbing a 5-story staircase. Stair climbing is a common provocation in acrophobia research (e.g., Emmelkamp, Krijn, Hulsbosch, de Vries, Shuemie, & van der Mast, 2002; Wolitzky & Telch, 2009). Participants are asked to climb as high on the staircase as they are willing. Additionally, to increase participants’ anxiety, participants were asked to complete up to four tasks on each story: 1) stand near the railing, 2) look at a target placed on the ground below, 3) stand on a short stool (12.25" × 10" × 7.12"), and 4) look at a target placed on the ground below while standing on the stool. Avoidance is operationalized by adding the number of stories a participant climbed plus the percentage of tasks the participant completed on that landing (e.g., a participant who climbed to the second landing and stood near the railing, but refused to look at the target below would score a 2.25).

The Balcony Task measures the extent of subjective fear, anxiety-related body sensations, and anxiety-related cognitions experienced, in response to looking over the edge of a 2-story, 26 feet high balcony. To increase participants’ anxiety while on the balcony, they completed a guided imagery exercise in which they imagined themselves falling off the balcony (modified from Clerkin et al., 2009; see Appendix).

Procedure—Undergraduate participants completed the AQ-Anxiety as part of a larger battery of questionnaires through the university’s psychology department participant pool. Community member participants completed the AQ-Anxiety over the Internet after a link was emailed to them. Upon entering the lab and following informed consent, participants completed a brief demographic questionnaire and the PANAS-FS to get a baseline measure of state fear. Next, participants completed the HIQ and DASS (in random order). Participants then completed the balcony height exposure task, followed by the ACQ, BSQ, and the PANAS-FS (in fixed order) to evaluate their peak fear while on the balcony. Next, the stair climbing HAT was administered, followed again by the PANAS-FS to evaluate participants’ peak fear during the HAT. Participants then returned to the original study room to complete the PANAS-FS again to insure that they were not experiencing any residual fear before leaving the study.

Results

Descriptive statistics—Three height fear groups were established: individuals scoring in the bottom third of the AQ-Anxiety scores comprised the low height fear group ($n = 15$), those scoring in the middle third formed the medium height fear group ($n = 16$), and those

who scored at least a 45.45 on the AQ-Anxiety, and met additional criteria described above comprised the high height fear group ($n = 17$). Chi-square tests revealed that the groups did not differ by gender ($\chi^2 = .06, p = .97$) or ethnicity ($\chi^2 = 9.35, p = .31$). Further, as expected, analysis of variance (ANOVA) tests revealed that there were no significant differences between the height fear groups in baseline state fear as measured by the PANAS-FS ($F_{(2,45)} = 2.42, p = .10, \eta_p^2 = .10$), or depression symptoms as measured by the DASS21-DS ($F_{(2,45)} = .73, p = .49, \eta_p^2 = .03$). Due to community members participating in the high height fear group (but not in the other two height fear groups) the three groups significantly differed in age ($F_{(2,45)} = 11.65, p < .001, \eta_p^2 = .34$). Specifically, the high height fear group had a higher mean age compared to the low and medium height fear groups (all $p < .001$), who did not differ from one another ($p > .10$).

As expected given that we recruited participants based on their AQ-Anxiety scores, the three height fear groups had significantly different AQ-Anxiety scores ($F_{(2,45)} = 144.57, p < .001, \eta_p^2 = .87$). Follow-up Scheffe tests showed that AQ-Anxiety scores across the three groups were all significantly different from one another in the expected direction (all $p < .05$). Further, as expected, the low and medium height fear groups were significantly different from the high height fear group on all height fear measures: AQ-Anxiety, HIQ, average peak state fear on a height, avoidance on the HAT, ACQ, and BSQ (all $p < .01$). See Table 3 for descriptive statistics separated by height fear group.

Validity: Relationships with other variables—To evaluate the relationship between the HIQ and measures of fear responding while on a height, correlations were computed between the HIQ and avoidance on the HAT, average peak fear on a height, anxiety-relevant cognitions (ACQ), and anxiety-relevant body sensations (BSQ). For average peak fear, standardized residuals were calculated for both the balcony PANAS-FS and the HAT PANAS-FS so that peak fear on heights could be examined independent of baseline state fear (see recommendations for examining change in Hummel-Rossi & Weinberg, 1975). Given that the PANAS-FS standardized residuals for the HAT and balcony task were highly correlated ($r(46) = .78, p < .001$), the standardized residuals were averaged to create a more reliable indicator of fear on a height. Because the ACQ and BSQ were significantly skewed, log transformations (ln) were computed for both scales.

As expected, results suggested that more negative height-relevant interpretations on the HIQ are strongly related to higher average peak fear while on actual heights (PANAS-FS: $r(46) = .81, p < .001$), more anxious thoughts while on a balcony (ACQ: $r(30) = .79, p < .001$), more anxiety-related body sensations while on a balcony (BSQ: $r(34) = .80, p < .001$), and more avoidance during stair-climbing (HAT: $r(45) = -.60, p < .001$), supporting the HIQ's convergent validity.

To determine the incremental validity of the HIQ, a series of hierarchical regressions were conducted to evaluate if the HIQ predicted reactions to actual heights beyond the traditional measure of height fear symptoms (AQ-Anxiety; see Table 4). As expected, when HIQ scores were entered into each regression after AQ-Anxiety scores had been entered, HIQ remained a significant predictor of all fear-relevant reactions to the heights (avoidance on HAT, average PANAS-FS, ACQ, and BSQ; see Table 4).

Discussion

The Heights Interpretation Questionnaire (HIQ) is a new scale designed to measure height fear-relevant interpretation bias and to assess the relationship between biased interpretations and acrophobia symptoms. To evaluate the factor structure and psychometric properties of the HIQ, a series of three studies was conducted. Factor analysis revealed that the scale has four meaningful factors. Across the studies, the HIQ demonstrated strong reliability and

validity. Additionally, the HIQ is a robust predictor of fear and avoidance on actual heights, beyond a traditional measure of acrophobia symptoms.

Factor analyses indicate that the HIQ has four replicable factors: dangerousness of being on a balcony, dangerousness of climbing a ladder, physical consequences of anxiety, and emotional consequences of anxiety. This suggests that height-relevant interpretations are multi-faceted. Notably, the physical and emotional consequences of anxiety factors seem to be independent of the height situation described in the scenarios, suggesting these factors may emerge regardless of a person's particular fear-provoking situations. In contrast, the dangerousness factors seem more directly tied to the ladder and balcony scenarios used in the HIQ. Although not yet empirically evaluated, clinicians and researchers may consider using other scenarios that tap different height situations (e.g., staircase, airplane), while keeping the same validated response items established for the HIQ, to obtain dangerousness factors that ideographically match a given individual's height fear triggers.

In line with hypotheses, the HIQ and its subscales demonstrated strong reliability and validity across three studies. Consistent with past research (e.g., Clerkin et al., 2009; Menzies & Clark, 1995; Teachman et al., 2008), the current studies demonstrate that height fearful individuals interpret heights to be dangerous and they doubt their ability to cope with their anxiety. However, past research only focused on judgments of physical danger and ability to cope when confronted with an actual height. The HIQ provides clinicians and researchers a way to assess height-relevant interpretations without the need for a special environment or equipment. The HIQ was termed an *interpretation* questionnaire because the scenarios were designed to be somewhat ambiguous, so that participants would apply their own interpretive styles related to heights when responding to the scenarios. However, we recognize that the measure is comprised of a set of explicit cognitions and is not an on-line measure of interpretations. As expected, the HIQ predicted anxiety and avoidance on actual heights after controlling for acrophobia symptoms. These results provide support for cognitive models of anxiety (Beck & Clark, 1997; Williams et al., 1997) by offering evidence that biases in interpretation are related to a broad range of clinically meaningful acrophobic responses. Evaluating the treatment sensitivity of the HIQ should be examined in future research.

The results need to be evaluated in light of a few limitations. First, the HIQ has not yet been evaluated in a treatment-seeking acrophobic sample, or in other types of anxious samples. Second, using a measure of trait anxiety, such as the trait subscale of the State-Trait Anxiety Inventory (Spielberger et al., 1983), instead of the DASS21-DS, would have allowed for a more stringent test of the HIQ's discriminant validity. Third, including some of the on-line judgment questions used in past research (e.g., Menzies & Clark, 1995) in Study 3 would have provided another useful check for convergent validity. Despite these limitations, these studies suggest that the HIQ has good psychometric properties and is a strong predictor of fear and avoidance on actual heights. The HIQ shows promise as a new tool to investigate cognitive processing biases in acrophobia.

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Heights Interpretation Questionnaire (HIQ)

You will be asked to imagine an event in your head. Think about yourself in the event as much as possible. After you read about the event, some thoughts about the event are listed. It is your job to rate how believable you think each of these thoughts is. Don't rate how believable you think each thought is right now. Instead rate how believable you think each thought would be when you are in the event. Next to each thought, circle the number to show your answer. Remember that it is very important that you try to imagine yourself in the event as much as possible.

Situation #1

Imagine that you are climbing a ladder that is leaning against the side of a two story house. As you move from one rung to the next, you feel the cold metal beneath your hands. You pass a window on the first floor of the house. You continue to climb, feeling the wind on your face. You pass a window on the second floor of the house. You look down and the ground looks very far away.

How likely is it that...

	Not Likely		Some-what Likely		Very Likely
1. You will hurt yourself.	1	2	3	4	5
2. You will fall.	1	2	3	4	5
3. You will not be able to tolerate your anxiety.	1	2	3	4	5
4. You will panic and lose control.	1	2	3	4	5
5. You are not safe.	1	2	3	4	5
6. You will faint.	1	2	3	4	5
7. You will freeze and not be able to climb back down the ladder.	1	2	3	4	5
8. Being on the ladder is dangerous.	1	2	3	4	5

Situation #2

Imagine that you are on a balcony on the 15th floor of a building. As you hold onto the warm metal railing that comes up to your waist, you feel the heat of the sun on your face. You listen to the sounds of cars and people down below. You look down and the people and cars on the ground seem small and very distant. Even the tree tops down below seem far away.

How likely is it that...

	Not Likely		Some-what Likely		Very Likely
1. You will hurt yourself.	1	2	3	4	5
2. You will fall.	1	2	3	4	5

	Not Likely		Some-what Likely		Very Likely
3. You will not be able to tolerate your anxiety.	1	2	3	4	5
4. You will panic and lose control.	1	2	3	4	5
5. You are not safe.	1	2	3	4	5
6. You will faint.	1	2	3	4	5
7. You will freeze and not be able to get off the balcony.	1	2	3	4	5
8. Being on the balcony is dangerous.	1	2	3	4	5

Imagery Script

“Now I’d like you to do an imagery exercise, I want you to imagine this situation not as if you were an actor in a play, but as if you were really there, looking out at it through your own eyes. Please close your eyes and imagine yourself leaning out far over the edge of the balcony.”

Make sure participant closes his or her eyes and keeps them closed. Say the following slowly, allowing participant time to form a detailed image.

“Imagine how the balcony wall feels as it presses into your body and think about what you are seeing as you look down at the ground. Now imagine that you’ve leaned out too far and are losing your balance. Your stomach lurches suddenly as you slip, topple over, and begin to fall toward the ground. Think about where you would be looking and imagine the sights that you see as you fall. Think about what sounds you hear as you rush toward the ground. Think about what you feel on your skin and in your muscles as you fall. Imagine what you would be thinking and how you would be feeling emotionally. Remember how this is similar to other times when you have lost your balance and fallen. Now I want you to hold that image in your mind and replay it over and over.”

Have participant focus on image for 30 seconds.

Highlights

- We evaluated the psychometrics of the Heights Interpretation Questionnaire (HIQ).
- Results revealed four factors and suggest good reliability and validity.
- The HIQ predicts subjective distress and avoidance on heights.
- The HIQ shows promise as a tool to investigate cognitive processing biases.

Table 1

Descriptive statistics and factor loadings for HIQ items in Studies 1 and 2

Factors and Associated Items	Study 1 N = 553		Study 2 N = 308	
	Factor Loading	M	SD	Factor Loading
Factor I: Dangerousness of being on a balcony				
You will hurt yourself. ^B	.80	1.34	.71	.73
You will fall. ^B	.83	1.39	.75	.78
You are not safe. ^B	.78	1.63	.88	.83
Being on the balcony is dangerous. ^B	.78	1.80	.99	.78
Factor II: Dangerousness of climbing a ladder				
You will hurt yourself. ^L	.80	2.27	1.04	.80
You will fall. ^L	.79	2.23	1.04	.81
You are not safe. ^L	.76	2.70	1.12	.81
Being on the ladder is dangerous. ^L	.71	3.09	1.12	.78
Factor III: Physical consequences of anxiety				
You will faint. ^L	.80	1.18	.49	.79
You will freeze and not be able to climb back down the ladder. ^L	.60	1.58	.94	.42
You will faint. ^B	.71	1.11	.38	.72
You will freeze and not be able to get off the balcony. ^{B, ^}	.49	1.21	.61	.50
Factor IV: Emotional consequences of anxiety				
You will not be able to tolerate your anxiety. ^L	.80	2.03	1.14	.80
You will panic and lose control. ^L	.50	1.61	.86	.52
You will not be able to tolerate your anxiety. ^B	.66	1.54	.96	.74
You will panic and lose control. ^{B, ^}	.32	1.25	.62	.39

Note. Items from the balcony scenario are followed by the superscript B, and items from the ladder scenario are followed by the superscript L. Based on theoretical considerations, the two items that originally loaded on Factor 1 (followed by “^”) were assigned to factors III and IV.

Table 2

Regressions to examine relationship between Heights Interpretation Questionnaire and other variables

	B	SE B	β
Heights Interpretation Questionnaire			
<u>Study 1</u>			
AQ-Anxiety	.31	.02	.60**
DASS21-DS	.12	.05	.09*
<u>Study 2</u>			
AQ-Anxiety	.31	.02	.61**
DASS21-DS	.14	.06	.11*

*Note.***
p<.001,*
p<.05.

AQ-Anxiety = Acrophobia Questionnaire-Anxiety Subscale; DASS21-DS = Depression Anxiety Stress Scales short form - Depression Scale.

Table 3

Descriptive statistics (Means and SDs) for Study 3

	Low Height Fear <i>n</i> = 15		Medium Height Fear <i>n</i> = 16		High Height Fear <i>n</i> = 17	
	M	SD	M	SD	M	SD
Baseline Measures						
AQ-Anxiety	9.87 ^a	3.85	22.44 ^b	3.69	60.54 ^c	13.95
Heights Interpretation Questionnaire	23.93 ^a	4.45	26.30 ^a	5.37	55.99 ^b	14.13
State Fear (PANAS-FS)	7.00	1.46	6.69	.87	7.76	1.82
DASS21-DS	4.93	4.95	4.25	4.49	6.57	7.05
Responses to Height Exposures						
State Fear (PANAS-FS)	8.47 ^a	2.83	8.57 ^a	2.74	20.87 ^b	4.28
Avoidance	4.8 ^a	.34	4.95 ^a	.19	3.74 ^b	1.12
ACQ	.33 ^a	.62	2.00 ^a	1.83	18.47 ^b	11.44
BSQ	1.68 ^a	2.26	2.38 ^a	2.25	20.36 ^b	11.64

Note. Group differences are noted by unique letter superscripts (i.e., 'a' versus 'b') and are all significant at $p < .01$. AQ-Anxiety = Acrophobia Questionnaire-Anxiety Subscale; HIQ = Heights Interpretation Questionnaire; PANAS-FS = Positive and Negative Affect Schedule-Fear Subscale; DASS21-DS = Depression Anxiety Stress Scales-Short Form-Depression Subscale; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Body Sensations Questionnaire. Avoidance is scored by the number of stories a participant climbed plus the percentage of tasks the participant completed on that landing.

Table 4

Study 3: Hierarchical regressions to demonstrate predictive validity of HIQ beyond AQ-Anxiety

	B	SE B	β
Avoidance on HAT			
<u>Step 1</u> ($R^2 = .26$)			
AQ-Anxiety	-.55	.14	-.51**
<u>Step 2</u> ($\Delta R^2 = .10$)			
AQ-Anxiety	-.14	.20	-.13
HIQ	-.03	.01	-.50*
Average Peak Fear (PANAS-FS)			
<u>Step 1</u> ($R^2 = .51$)			
AQ-Anxiety	0.81	0.12	.72**
<u>Step 2</u> ($\Delta R^2 = .16$)			
AQ-Anxiety	0.27	0.15	0.23
HIQ	0.03	0.01	.63**
Anxiety-related Cognitions (ln of ACQ)			
<u>Step 1</u> ($R^2 = .72$)			
AQ-Anxiety	1.23	0.14	0.85**
<u>Step 2</u> ($\Delta R^2 = .05$)			
AQ-Anxiety	0.84	0.20	0.58
HIQ	0.02	0.01	.35*
Anxiety-related Body Sensations (ln of BSQ)			
<u>Step 1</u> ($R^2 = .61$)			
AQ-Anxiety	1.13	0.16	.78**
<u>Step 2</u> ($\Delta R^2 = .10$)			
AQ-Anxiety	0.59	0.21	.41*
HIQ	0.03	0.01	.48*

*Note.***
p<.001,*
p<.05.

AQ-Anxiety = Acrophobia Questionnaire-Anxiety Subscale; HIQ = Heights Interpretation Questionnaire; PANAS-FS = Positive and Negative Affect Schedule-Fear Subscale; ACQ = Agoraphobic Cognitions Questionnaire; BSQ = Body Sensations Questionnaire.