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Measuring Attitudes Towards the Internet: The General Internet Attitude Scale

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The General Internet Attitude Scale (GIAS) is a questionnaire designed to explore the underlying components of the attitudes of individuals to the Internet, and to measure individuals on these attitude components. Previous Internet attitude research is critiqued for its lack of a clear definition of constructs. GIAS was developed starting from the well-established three-component psychological model of attitude (affect, behavior, cognition) into which applicable statements found in previous Internet attitude measures were fitted. GIAS was developed using an iterative psychometric process with four independent samples (N = 2,200). During iterations, the wordings of the items were refined, and exploratory and confirmatory factor analyses identified four underlying factors in the scale: Internet Affect, Internet Exhilaration, Social Benefit of the Internet, and Internet Detriment, all of which had acceptable internal reliabilities. The final instrument contains 21 items and demonstrates strong reliability achieving an overall Cronbach's alpha value of 0.85. The behavioral component of the three-factor attitude model could not be replicated, although there was a medium, positive correlation between GIAS and a measure of Internet self-efficacy. Attitude and self-efficacy are important personal constructs and may well contribute to the large variance that usability metrics are known to exhibit.

1. INTRODUCTION

Our observations of individuals' reactions when completing online tasks for a website evaluation led us to this research topic. It was observed that some individuals attributed their difficulties navigating the website to themselves, stating that it was their skills (or lack thereof) that contributed to their failure in locating the required information to complete the task. Others were inclined to attribute their difficulties to the website, sometimes commenting that the website was difficult to use or poorly presented. Examination of the literature yielded surprisingly few explanations in any quantitative sense for such discrepancies in individual responses. Some studies (e.g., Eastin & LaRose, 2000; Torkzadeh & Van Dyke, 2001) attempted to measure individuals' confidence in using the Internet through the use of psychometric scales. However, these studies failed to employ conventionally accepted methodologies for the measurement of self-efficacy (a theoretical critique of this research may be found in Joyce & Kirakowski, 2014). As a result, the validity of these scales and emerging conclusions are difficult to ascertain.

Similar issues arose in studies of concepts related to self-efficacy and individual differences in online behavior (e.g., Durndell & Haag, 2002; Tsai, Lin, & Tsai, 2001). Some researchers (e.g., Jackson et al., 2003; Schumacher & Morahan-Martin, 2001) who were interested in patterns of Internet usage hypothesised that Internet *attitudes* may influence Internet use, which would be consistent with a general social psychological explanation (e.g., Aronson, Wilson, & Akert, 2002). As a result, a number of researchers went about developing scales to measure Internet attitudes. However, in attempts at developing an Internet attitude measure, the major issue of concern was the lack of a recognized theoretical framework. On one hand, constructs that are not normally considered to be attitudinal were attributed to attitude (e.g., Tsai & Lin, 2004; Zhang, 2007), and on the other, items that did not relate to any recognized attitudinal construct were included in initial item pools that primarily describe Internet *uses* rather than *attitudes* (e.g., Morse, Gullekson, Morris, & Popovich, 2011; Tsai et al., 2001). Thus, whatever such scales were measuring, it was not attitude as conventionally understood within psychology (a more detailed critique of previous research on Internet attitude may be found in Joyce & Kirakowski, 2013).

Taking the aforementioned issues into account, it became clear that there was a need for a standardised psychometric scale, recognizable as such from well-established social psychological theory, which would measure attitude to, and self-efficacy in an Internet environment. The major objective of this article is thus to outline the development of a scale that measures the attitudes of individuals to the Internet. We differentiate ourselves from research that attempts to predict specific system usage (e.g., SUMI, Kirakowski & Corbett, 1993; TAM, Davis, Bagozzi, & Warshaw, 1989), to measure the possibly related concept of computer anxiety (e.g., Heinssen, Glass, & Knight, 1987), or to assess attitudes to computer technology in general (e.g., Nickell & Pinto, 1986). We began by drawing

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on the social psychological literature on attitudes to provide a theoretical foundation for this research.

2. THE CONSTRUCT OF ATTITUDE

Since 1918, when Thomas and Znaniecki (as cited in Allport, 1935) initiated the discussion about attitudes, much debate has taken place among psychologists about the definition and structure of this construct. However, most psychologists today now agree that the emphasis lies on the *feeling* and *evaluative* elements of attitude. With this in mind, an attitude can be defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly & Chaiken, 2007, p. 598). One-, two-, and three-component models of attitude were proposed over the earlier half of the 20th century (e.g., Allport, 1935; Katz & Stotland, 1959; Thurstone, 1931). However, researchers were swift to adopt Katz and Stotland's (1959) proposition of a three-component attitude model (e.g., Krech, Crutchfield, & Ballachey, 1962; Rosenberg & Hovland, 1960), and this has since remained the modal model of attitude in social psychological theory. The three components are briefly described as *affect*—an emotion that charges the idea, a feeling that may be good or bad when thinking about the attitude object; *behavioral intention*—the individual's predisposition to action with regard to the attitude object; and *cognition*—the beliefs and ideas a person has about the attitude object. However, there has been a lack of empirical evidence investigating such theories. In fact, very few studies have explored the existence of the three-component model of attitudes in any domain. The existing research that *did* explore the three components and their relationship with one another (e.g., Breckler, 1984; Woodmansee & Cook, 1967) found inconsistent evidence for the presence of the three components. Nonetheless, although there may not be sufficient evidence to prove this model beyond dispute, it is the best working hypothesis that social psychology at present possesses for relating dispositions to behaviors.

3. ATTITUDE AND SELF-EFFICACY

The research reported in this article therefore took as its starting point the three-factor model, which social psychologists agree is the 'modal model' of attitude. Earlier two-factor models, which the three-component model effectively supplanted in social psychology, did not explicitly incorporate a 'behavioral intention' component but concentrated on 'affect' and to some extent 'cognition' or beliefs.

The motivation for following the three-component model was reinforced by the view that many of the studies that investigated Internet attitude (see section 1) obviously considered that behavior in some form was indeed a component of attitude. Past research (e.g., Tsai & Lin, 2004; Zhang, 2007) incorrectly included self-efficacy as a subscale of Internet attitude, and then incorrectly attempted to measure the self-efficacy construct in terms of past behavior. By conceptualizing attitude as self-efficacy, however, these researchers stepped out of the social psychological definition of attitude and then furthermore attempted to measure self-efficacy in terms of past behavior. We sought therefore to find a classic attitudinal component relating to *behavioral intention* in our questionnaire, which is in line with recent social psychological theories. As outlined in section 1 however, it was also noted that attempts at measuring Internet self-efficacy *independent* of Internet attitude was vitiated by methodological issues. Thus, because self-efficacy itself is also of concern (although is not a recognizable aspect of attitude), we also considered that a tool for the measurement of Internet self-efficacy, uncontaminated by attitude, should be developed in parallel. While the theory behind the construct of self-efficacy and its measurement has been described in detail elsewhere (Joyce & Kirakowski, 2014), in brief, self-efficacy focuses on judgments of perceived capabilities to perform a task or activity and is measured by asking individuals to rate the strength of their belief in completing a specific activity on a self-rating scale. By closely following recommendations for the creation of a self-efficacy scale, an Internet Self-Efficacy Scale was also developed for the purposes of this research. The essential features of this method are that respondents are invited to rate a list of activities carried out on the Internet on (a) how frequently they engage in the activities and (b) how confident they felt they were on these same activities. The Internet Self-Efficacy score is then an average of the self-reported confidence ratings about completing the activities, weighted by frequency of use.

The Internet Self-Efficacy Scale was developed in parallel with the Internet attitude measure in the later stages of the research reported here (Studies 3 and 4). Our hypothesis was that Internet Self-Efficacy, if measured correctly, would form a component moderately correlated with the measure of attitude when conventional methodologies for attitude measurement were followed. The Internet Self-Efficacy Scale is presented in Appendix B.

4. DEVELOPMENT OF THE GENERAL INTERNET ATTITUDE SCALE

4.1. Scale Development

The three-component model was therefore the starting point for the general internet attitude scale (GIAS). It initially consisted of items relating to *affect* (feelings, likes/dislikes about the Internet), *behavioral intention* (the intention to act a certain way on the Internet), and *cognition* (beliefs and cognitions of individuals about the Internet).

The scale takes the form of a Likert summated ratings scale—one of the most frequently used tools in the social sciences when measuring attitudes (Spector, 1992). There are four characteristics of a summated rating scale: (a) the scale must contain multiple items; (b) each item must measure something that has an underlying, quantitative measurement continuum; (c) there are no "right" or "wrong" answers to items; and (d) each item is a statement and respondents are invited to give a rating for each statement (Spector, 1992).

4.2. Item Generation

Existing questionnaires for the measurement of Internet attitudes were consulted when generating items for the GIAS. An initial item pool of 97 statements was used in the first stage of scale development. Statements from four previous questionnaires that exemplified the best attempts at creating items depicting Internet attitudes in the past decade were collated. There were 19 items from Weiser's (2000) Internet attitude survey, 18 items from Tsai et al.'s (2001) Internet attitude scale, 20 items from Durndell and Haag's (2002) Internet attitude scale, and 40 items from Zhang's (2007) Internet attitude scale. These were the total number of items in each of the scales, and there was some overlap among items.

The creation of Version 1 of the questionnaire proceeded in two redactive stages. The first stage of redaction was to address the issues outlined earlier (see section 1) in Internet attitude scale development. Statements that addressed specific uses of the Internet were removed, as they simply describe patterns of use that may reflect individual circumstances and do not represent an underlying attitude. Examples of these statements include "I like to use the Internet to communicate with my friends" or "I use the Internet regularly throughout school." Other problematic items were statements that referred to feelings of confidence with using the Internet, for example, "I feel confident using an Internet browser" or "I feel confident discussing questions with others through the Internet." Such items are rudimentary attempts at capturing feelings of self-worth (or perhaps self-efficacy) rather than attitudes and do not relate to the modal attitude model.

The second stage of redaction was to apply the modal theoretical framework of attitudes to each item in the final item pool. Each remaining item was examined to identify whether the statement represented (or *could* represent) one of the three components of an attitude: affect, behavioral intention, or cognition. If a statement could be reworded to represent one of the components of an attitude, then this was done. If however, a statement did not in any way represent one of the components of an attitude, it was deleted.

After the redactive process, the final item pool consisted of 27 items. There were eight statements representing the affect component, eight statements representing the behavioral intention component, and 11 statements representing the cognition component of an Internet attitude. All 27 items were attitudinal statements, some positively and some negatively worded. With regard to the response surface, Spector (1992) denoted that "agreement response choices are usually bipolar and symmetrical around a neutral point" (p. 19). Five response anchors were thus employed: *strongly disagree, slightly disagree, no opinion, slightly agree,* and *strongly agree*. The scale examines the extent to which participants agree with each statement.

4.3. Overview of Studies

The creation of a psychometric scale is an iterative process; thus the development of the GIAS took place across four studies. Study 1 involved the testing of Version 1 of the scale. The objectives of Study 1 were (a) to discover whether a factor structure underlay the individual items; (b) if a factor structure emerged, to delete items that clearly did not belong to a factor; and (c) to identify items that could be retained after rewording to fit a factor that they loaded on, albeit weakly. If Study 1 was successful, it was planned to continue iterating a test–analyze–revise cycle until a moderately stable factor structure had been achieved. This comprised Studies 2 and 3. The final iteration (Study 4) with an independent sample was then planned, for which a confirmatory factor analysis would be applied. (The Internet self-efficacy measure was introduced as part of the test battery for Studies 3 and 4 for the reasons outlined in section 3 of this article.)

5. STUDY 1

Version 1 of the GIAS consisted of 27 items. These items were identified following the redactive process outlined in section 4.2 of this article. Version 1 of the GIAS was completed by a sample of 415 Irish participants recruited using ad hoc sampling methods. There were 220 female and 193 male participants; two participants did not indicate their gender. Participants were between 17 and 65 years of age. The majority of participants (66.27%) were 18 to 24 years of age. The remainder of participants were spread relatively consistently across age groups. With regard to occupational composition, 278 (66.98%) participants in this sample were students. The remaining participants (33.02%) came from a wide range of occupations including teaching, nursing, managerial positions, librarians, engineering, and accountancy. Frequency of use of the Internet was also asked. Participants reported that they used the Internet regularly with the majority of participants (90.60%), indicating that they used the Internet on a daily basis and a further 7.22% of participants using the Internet "a few times a week."

Initial screening to assess the suitability of the data for factor analysis was first carried out. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin statistic was .90 and exceeded the minimum recommended value of .60 (Tabachnick & Fidell, 2007), indicating that the sample size was appropriate. Bartlett's Test of Sphericity reached statistical significance ($p < .001$), supporting the factorability of the matrix.

Bandalos and Finney (2010) suggested that methods for determining the number of factors should be statistically, mathematically, and heuristically based. Statistical procedures for determining the number of factors to retain include Bartlett's (1950, 1951) chi-square test, Velicer's (1976) Minimum Average Partial procedure, and Horn's (1965) Parallel Analysis;

mathematically based tests refer to the use of eigenvalues (Kaiser, 1960), whereas heuristic procedures refer to items such as Cattell's (1966) Scree test (Bandalos & Finney, 2010). Cliff (1987) argued strongly against a strict application of the eigenvalues greater than 1 strategy. Henson and Roberts (2006) reported that of all of these methods, parallel analysis has been found to be the most accurate procedure.

The following criteria for factor retention were used: (a) eigenvalues greater than 1, (b) Horn's Parallel Analysis, and (c) inspection of Cattell's Scree Plot (for the point of inflection). Of the three criteria, Horn's Parallel Analysis was given the greatest consideration for the reasons outlined in the previous paragraph.

1. Eigenvalues: The extraction analysis identified six factors with eigenvalues of greater than 1. These six factors represented 59.15% of the cumulative variance.
2. Horn's Parallel Analysis: The parallel analysis was conducted using a software program developed by Watkins (2000). Watkins's software program generates 1,000 sets of random data and calculates the average eigenvalues for these 1,000 generated samples based on the real data file in this study. The eigenvalues obtained in the real data file in this study are then compared with the corresponding values from the random results generated by the parallel analysis. If the obtained value is larger than the random value from the parallel analysis, then the factor is retained; if it is less, then it is rejected. For this analysis, four obtained values were larger than the random values, therefore suggesting that four factors be retained for further analysis.
3. Inspection of Cattell's Scree plot indicated a four-factor solution, consistent with the results of the parallel analysis.

As a result, it was decided to retain four factors (which explained 50.78% of the variance). The factors were named as follows:

Social Benefit of the Internet (the positive influence that the Internet has on society and the benefits it creates in societal living), *Internet Affect* (feelings, both positive and negative, that individuals may have about the Internet), *Internet Exhilaration* (the excitement and personal thrills that people experience when using, or are about to use, the Internet), and *Internet Detriment* (the negative effects of the Internet at both an individual and societal level).

Common factor analysis was the chosen method for this research as it is the most appropriate analysis when the researcher's intention is to interpret the components as latent dimensions or factors (Bandalos & Finney, 2010). An oblique rotation was applied to the data (Bandalos & Finney, 2010). For the current and subsequent analyses, direct oblimin was the oblique rotation utilized as it simplifies factors by minimizing cross-products of loadings and can handle a wide range of factor intercorrelations (Tabachnick & Fidell, 2007).

When interpreting the factor solution, Bandalos and Finney (2010) recommended attending to the structure coefficients initially, followed by an evaluation of the pattern coefficients to comprehend the unique factor-variable relationships. Keeping this in mind, all items that loaded on each of the factors on both the structure matrix and the pattern matrix resulting from the oblimin rotation were examined. All of the items that loaded on each of the four extracted factors in the analysis were examined. Typically, items were included on a particular factor if they had high factor loadings ($> .30$) and fit with the definition of that particular factor (Bandalos & Finney, 2010). Items were deleted if an item achieved a factor loading across several factors, if the factor loading was less than .30, or if the item did not semantically fit on the factor.

In total, six items were deleted from the analysis because of inconsistent loadings and definitional fit, reducing the item pool to 21 items.

6. STUDY 2

Following the deletion of items from Version 1 of the scale, it was felt that some of the subscales lacked an adequate number of items. In particular, Subscale 2 (Internet Affect) was of concern, as affect is thought to be the central component of an attitude, and the subscale in its current form contained only five items representing this component. As a result, statements of an affective nature were added in hopes of strengthening the overall scale. The affective words that were added described the emotional responses of an individual but did not describe their *actions*. In total, seven new statements of an affect nature were added to the scale. Examples of these statements include "I feel overwhelmed by the Internet" and "The Internet excites me." As well as the addition of the new *affect* items, one other item was amended to emphasise its affective nature.

Two previously deleted "behavioral intention" items were reworded and included to determine if they would achieve stronger factor loadings in the current analysis.[1] This resulted in a 31-item scale for Version 2 of the GIAS.

There were 705 participants in this study (448 female, 257 male), recruited in University College Cork, Ireland. Therefore, the vast majority of the sample (94.18%) was university students with 73.62% of the sample in the 19–24 years age group. Most participants used the Internet on a regular basis, with 95.75% of participants indicating that they use the Internet daily and the remaining 4.25% of participants stating that they use the Internet a few times a week.

The same preliminary tests were carried out for factor retention as for Study 1. Results from one of the tests suggested the initial retention of five meaningful factors. When five factors were extracted from the data, a meaningful interpretation of the data was not produced however and the fifth factor had just the two behavioral intention items loading on that factor.

[1]These two items proved to be troublesome to the very final analysis, and in Study 4 they were finally deleted.

As a result, it was decided to retain four factors that explained 48.15% of the variance and to see if the fifth factor items could be reassigned meaningfully to one of the other four factors.

Common factor analysis with an oblique rotation was carried out on the 31-item questionnaire. Inspection of the structure coefficients identified a number of items that had factor loadings across several factors. Six items achieved factor loadings across three factors in the structure matrix; however, these items achieved high factor loadings on one factor only in the pattern matrix, so these items were retained pending rewriting—keeping the modal theoretical model of attitude in mind. In total, four items were deleted for reasons outlined in Study 1, reducing the item pool to 27 items. Enough rewriting and deleting had been done to warrant a third iteration.

7. STUDY 3

In addition to rephrasing statements for this stage of scale development, the response anchors for Internet frequency were also revised, as they arose as an issue of concern. Up until now, participants had been provided with five response options for Internet frequency: *never, a few times a year, a few times a month, a few times a week,* and *daily*. However, it was felt that there may be participants who used the Internet a few times a week for instance (which could be interpreted by the researcher as infrequently), but the participant may feel that they use the Internet a lot. In other words, previous versions of the scale captured how often participants used the Internet in *real* terms but did not capture participants' subjective feelings of how often *they* felt they use the Internet. As a result, the response choices for the question "How often do you use the Internet?" were changed to *never, rarely, sometimes, often,* and *very often* for the current and subsequent administration of the scale. For the reasons outlined in section 3, and because of the emerging difficulties with the behavioral intention factor, we also included the self-efficacy measurement instrument as part of the test battery in this study and in Study 4 (see Appendix B).

The final sample of participants who completed Version 3 of the GIAS consisted of 657 individuals who were recruited via e-mail using a snowballing sampling (a sampling method used to obtain participants from extended associations through participants initially identified by the researcher; Morgan, 2008). The final sample consisted of 370 male and 287 female participants. Participants were from a number of different countries but primarily from Ireland, United Kingdom, United States, and Australia. Participants varied in age; however, the majority of participants (82.95%) were between 25 and 54 years of age. Most participants used the Internet regularly, with 553 participants (84.17%) indicating that they used the Internet *very often* and 85 participants (12.94%) indicating that they used it *often*.

The methods of analyses to identify factor retention were again repeated as per Study 1. The eigenvalues that were generated from the data are displayed in the Scree plot in Figure 1.

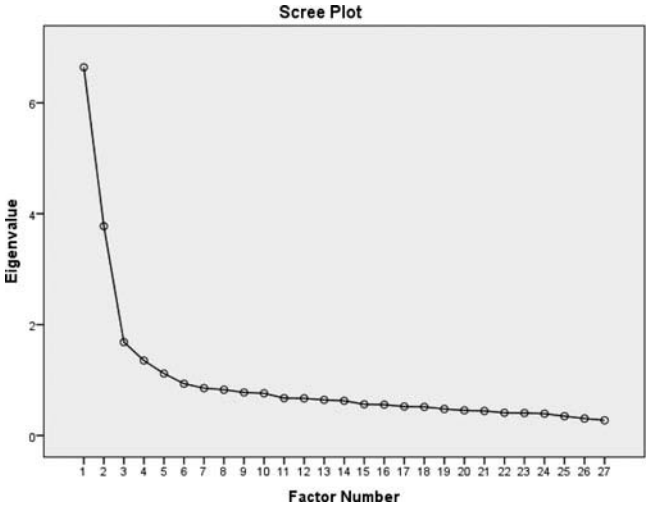

FIG. 1. Cattell's scree plot for the General Internet Attitude Scale Version 3.

As in Study 2, two items made up a fifth factor again, but the remaining items were difficult to interpret in a five-factor solution. Common factor analysis with an oblique rotation was again performed and yielded a much more meaningful four-factor solution which explained 49.82% of the variance, and incorporated the two behavioral intention items into other factors with which they had a tolerable fit. Two items achieved similar factor loadings across two factors in both the structure and pattern matrix, so these items were deleted, reducing the item pool to 25 items. Again, there were two further items with low loadings, but they were kept because they conformed semantically to the factors on which they loaded.

Having determined that the factor loadings remained relatively consistent across three different samples, a reliability analysis was carried out. Cronbach's alpha was calculated as a measure of internal consistency for the four subscales and overall scale. The Cronbach's alpha coefficients are reported in Table 1.

Each of the subscales and the total scale achieved satisfactory reliability values.

TABLE 1
Reliability Values for Subscales and Total Scale, General Internet Attitude Scale Version 3

Name	No. of Items	Cronbach's α
Internet Affect	9	.87
Internet Exhilaration	5	.73
Social Benefit of the Internet	7	.79
Internet Detriment	4	.66
Total Scale	25	.86

The factorial structure at this stage was similar to that of Study 2, and with the deleting of two items that had been problematical at Study 2 stage, the overall reliability score for the scale was .86. GIAS was considered to have reached a stable form at this stage.

8. STUDY 4

The fourth and final step in the development of the GIAS involved completing a confirmatory factor analysis (CFA) to test how well the measured variables (scale items) represent the small number of latent constructs that had been identified (Hair, Black, Babin, & Anderson, 2010). CFA predicts the goodness of fit of the hypothesized models in relation to acceptable cutoff values, which are outlined next.

The theory that informs the fit of the measured variables within their constructs is based on the results obtained from the third and final iteration of the GIAS. The final scale consisted of 25 variables from four underlying constructs. A four-factor model of Internet attitudes was thus specified in which Internet Affect, Internet Exhilaration, Social Benefit of the Internet, and Internet Detriment were the four latent factors. The four latent factors were permitted to be correlated based on prior analyses which indicated a relationship among the factors.

The final sample for this study consisted of 841 participants who were recruited via e-mail using the snowballing sampling technique. The final sample consisted of 314 male participants (37.3%) and 527 female participants. Participants were again from a number of different countries including Ireland, United Kingdom, United States, and Australia. Participants varied in age from 16 years and older; the majority of participants (64.69%) were between 25 and 44 years of age. Most participants used the Internet regularly, with 97.50% participants indicating that they used the Internet very often or often. As in Study 3, the measurement of self-efficacy was also part of the test battery.

The first confirmatory model (modeled on the factors emerging from Study 3) did not achieve a satisfactory goodness of fit with $\chi^2/df = 4.182$, which is more than twice the recommended cutoff value of 2.0 (Tabachnick & Fidell, 2007), although the comparative fit index, Tucker–Lewis index, and root mean square error of approximation results were excellent. Inspection of the path estimates identified two items that achieved extremely low loadings of .24 and .29, respectively. Hair et al. (2010) suggested that loadings should be at least .50 and ideally .70 or higher. These items were the same two items that consistently loaded on a fifth factor in the exploratory factor analyses in Studies 2 and 3. Two other items, which had consistently received relatively low loadings in Studies 2 and 3, also achieved relatively weak factor loadings here (.45 and .47). All four of these items were deleted.

The second model was then tested for goodness-of-fit. Model 2 consisted of the same four factors as in the previous analysis: Internet Affect, Internet Exhilaration, Social Benefit of the Internet, and Internet Detriment.

TABLE 2
Standardized Solutions by Confirmatory Factor Analysis for Model 2

	Factor			
Item	Internet Affect	Internet Exhilaration	Social Benefit of the Internet	Internet Detriment
15	.70			
19	.79			
5	.71			
2	.69			
10	.76			
8	−.56			
24	−.60			
22	.64			
12	.56			
20		.92		
9		.50		
6		.80		
14			.67	
11			.72	
21			.70	
1			.56	
25			.58	
4			.52	
16				.82
13				.53
3				.59

The factor loadings for Model 2 are presented in Table 2.

8.1. Proposed Model Hypotheses (H2) Results

The results of the specified model yielded a comparative fit index value of .918 and a Tucker–Lewis index of .906. The root mean square error of approximation value was .058. The chi-square was significant, at 695.033, with a degree of freedom of 183, resulting in the value for χ^2/df of 3.798—still above the recommended cutoff point but tolerable bearing in mind the large sample size ($n = 841$). Model 2 achieved excellent fit in the CFA after problematic item deletion.

8.2. Reliability

Having identified an excellent model fit for H2, a reliability analysis was subsequently carried out. The Cronbach's alpha coefficients are reported in Table 3. Each of the subscales and the total scale achieved satisfactory reliability values.

TABLE 3
Reliability Values for Subscales and Total Scale, General Internet Attitude Scale Version 4

Name	No. of Items	Cronbach's α
Internet Affect	9	.87
Internet Exhilaration	3	.76
Social Benefit of the Internet	6	.79
Internet Detriment	3	.67
Total Scale	21	.85

8.3. Summary So Far

Following four rounds of data collection and analyses, efforts to apply the three-component model of attitudes uncovered an underlying structure of four factors, namely Internet Affect, Internet Exhilaration, Social Benefit of the Internet, and Internet Detriment. The final version of the GIAS consists of four subscales with satisfactory reliability values and contains 21 statements, the reliability of which is also satisfactory. The scale as it stands is accepted currently as the GIAS.

Although the three-component model of attitudes has not been explicitly replicated in the underlying structure of Internet attitudes, it was found that statements representing the originally proposed three components tended to "group" together in the four factors that emerged in the Internet attitude data. During the CFA, four items were deleted from the GIAS. These four items represented three of the originally proposed *behavioral intention* items and one cognitive item. Thus, following appropriate modification during the CFA to achieve the best model fit, the final 21-item GIAS contains only one *behavioral intention* item and 20 items representing *affect* and *cognitive* elements of Internet attitudes. Two of the four subscales (Internet Affect and Internet Exhilaration) consisted of statements relating to the emotional response (Affect) and the other two subscales (Social Benefit of the Internet and Internet Detriment) consisted of statements describing beliefs (Cognition).

8.4. Gender Differences

Numerous studies (e.g., Tsai et al., 2001; Weiser, 2000) have investigated gender differences with technology in an effort to better understand how male and female participants interact with it. Conflicting evidence for the existence of gender differences has been reported in such studies. It is possible that this conflicting evidence results from the use of questionnaires in which the construct under investigation is not clearly established or psychometrically robust. Research carried out by Joiner et al. (2005) and Helsper (2010) reported less extensive Internet use in women compared to men. More recently, research carried out by Ofcom (2013) still indicates that men have a higher estimated weekly volume of Internet use than women. These studies thus lend evidence to suggest that the Internet might be more frequently used by men, so it was of interest to determine if there would be accompanying gender differences in Internet attitudes. An independent samples t test was conducted on the mean attitude scores between male and female participants to investigate if there were any statistically significant differences between the groups. It was found that there were no significant differences in attitude scores between male and female participants on total attitude scores. The effect size was small. These results suggest that male and female individuals hold similar attitudes towards the Internet. The findings of Lewis (2002) with the Post Study System Usability Questionnaire also supports the finding of no effect for gender.

8.5. Age Differences

Because the Internet is a relatively recent phenomenon, it is possible that a division exists between individuals who have grown up immersed in an Internet environment, and those to whom the Internet is a new concept which was introduced at a later stage in life. Researchers such as van Duersen, van Dijk, and Peters (2011) suggested that younger generations are particularly skilled users of the Internet, as they have had exposure to the Internet throughout their entire life. The authors referred to research carried out by de Haan and Rijken (2002), who suggested that seniors did not have the opportunity to acquaint themselves with the Internet at school, thus lack the same level of use and ownership of Internet skills. Although it is thus logical to assume that there may be differences in Internet attitudes between younger and older age groups, few studies have actually investigated such differences. In this study, participants were asked to indicate which age group they belonged to. The age groups were $<$ 18 years, 18–24 years, 25–34 years, 35–44 years, 45–54 years, 55–64 years, and 65 years $+$. A one-way between-groups analysis of variance was conducted to explore differences in average total attitude scores across the seven age groups. There was a statistically significant difference in average total attitude scores for the seven age groups: $F(6, 834) = 3.14$, $p < .01$. The effect size was 0.22. Post hoc analyses indicated that the difference between the means of the $<$ 18 years group ($M = 3.49$, $SD = 0.47$) and 25–34 years group ($M = 3.95$, $SD = 0.49$) approached significance ($p = .06$). A steady decline in attitude scores was observed over the remainder of the age groups as age increased beyond the 25–34 years age group.

9. DISCUSSION

After three iterations of data collection and appropriate statistical analyses, followed by a fourth confirmatory factor analysis, the final scale consists of 21 items, with four subscales (see Appendix A). The scale has demonstrated satisfactory reliability. The four factors which emerged from the data and were confirmed in the final scale iteration were Internet Affect, Social Benefit of the Internet, Internet Exhilaration, and Internet Detriment.

The original three-component model of attitude was not replicated in the Internet attitude data analyses, which consistently produced four factors. However, the original attitude components tended to group together into two groups in the four-factor model. For example, although the original cognitive statements distributed across two different factors, the factors on which these items loaded tended to almost solely consist of cognitive items. The same can be observed in the affective factors. What is of particular significance in this research is the deletion of behavioral statements from the scale that occurred as a gradual process during scale development. By the final version of the GIAS there was *only one* remaining statement of a behavioral nature on the scale that was placed under the Internet Exhilaration factor. These findings are of significance in attitude theory in general, as little empirical evidence existed prior to this research to support the three-component model of attitude; the three-component model was theoretically important, and although no research had been done that refuted it, no research actively supported it, either. The current findings suggest that evaluations of attitude ought to focus on affective and cognitive elements in attitude measurement, which is in line with positions taken by early attitude theorists such as Thurstone (1931) and Allport (1935), and more recently by Eagly and Chaiken (2007).

The results of this research identified no significant differences between males and females in their Internet attitudes. Although the results of this research are somewhat contrary to previous studies where it had been suggested that males hold more positive Internet attitudes than females (e.g., Durndell & Haag, 2002; Tsai et al., 2001), the lack of secure scales for the measurement of Internet attitudes puts the validity of these previous findings into question. More recent studies by Jones, Johnson-Yale, Millermaier, and Perez (2009); Helsper (2010); and most recently Ofcom (2013) found that male individuals use the Internet more often than female, so it was reasonable to speculate that with such differences in Internet *use* between the sexes, there may also be gender differences in their Internet attitudes. Nevertheless, the current research identified no such differences, and male and female participants achieved similar scores on our Internet attitude measure.

Although there is minimal research that investigated age differences in Internet attitudes, we speculated that there may be age differences in attitudes towards the Internet as a result of differences across age groups in exposure to the Internet. Zickuhr and Madden (2012) outlined that older age groups continuously report lower levels of Internet use than younger age groups. Similarly, research carried out by OxIS (Dutton & Blank, 2011) and Ofcom (2013) identified similar trends with younger age groups (e.g., 16–24-year-olds) reporting higher levels of Internet use than older age groups (e.g., 65 years +). In line with these findings, the results from the analyses in the current study did identify age differences in Internet attitudes. It was found that the age group with the highest attitude scores were the 25–34 years age group. As age increased beyond the 25–34 years age group, Internet attitude scores decreased, indicating that the older age groups have less favorable attitudes towards the Internet. These results are also in line with the aforementioned research, which identified that as age increases, frequency of Internet use decreases. Results from this research also found Internet attitude scores to be strongly correlated with Internet frequency, suggesting that individuals who report high Internet use hold more positive attitudes towards the Internet than those with less Internet interaction.

9.1. Internet Attitude and Internet Self-Efficacy

At the beginning of this article, we outlined that many previous studies in this research area included self-efficacy as part of an Internet attitude. Although weaknesses were identified in previous scale development, it is nevertheless possible that these two constructs are related. However, there is minimal literature that explores the empirical relationship between these two constructs. To our knowledge, there is only one study that has done so (Wu & Tsai, 2006). Although positive correlations of a medium strength were obtained between participants' attitudes and the two subscales of the Internet self-efficacy scale developed in Wu and Tsai's (2006) study, participants' Internet attitude scores were only *weakly* correlated with their overall Internet self-efficacy scores. The authors did not offer any reasons for such observations.

Within the studies reported in this article, we consistently attempted to include and possibly augment the eight initial items relating to the behavioral intention component of attitude to the Internet. In four studies, we found that items relating to this component fell out of the factor analytic matrix; in Study 4, despite our attempts to include the remaining two behavioral intention items in the Internet Exhilaration factor, we found that a better solution was obtained when these items were removed. We therefore conclude that behavioral intention is not a component of attitude to the Internet. However, it is possible that the theoretically unrelated construct of self-efficacy could well represent the behavioral manifestation of attitude that many previous attitude theorists have attempted to include in their models, and that previous Internet attitude researchers also considered was of value to include in their scales.

These conclusions are in keeping with the standard social psychological definition of attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly & Chaiken, 2007, p. 598) and in contrast with self-efficacy, which is understood as "beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3). It should also be noted that the appropriate recommended methodologies for measuring these two constructs are markedly different (Joyce & Kirakowski, 2014).

Nonetheless, there is a medium, positive correlation between the 10-item Internet Self-Efficacy Scale and 21-item GIAS

($r = .43$, $n = 841$, $p < .001$), with positive Internet attitudes associated with high Internet self-efficacy. We take this as confirming the theoretical intention of previous researchers in human–computer interaction in an unambiguous and defensible manner.

9.2. Future Research

It is taken as a given in social psychology theory that the attitude a person has to an object or activity will influence the way they use the object or engage in the activity (e.g., Hogg & Vaughan, 2011). Bandura (1997) demonstrated that within educational psychology, self-efficacy is a good individual predictor of attainment. When we look at studies in human–computer interaction which evaluate devices and tools in a technological world, we generally find that research in this area has failed to evaluate *individual differences* in the context of such evaluations and that, at the same time, there is much variance present in both performance and subjective usability measures (as highlighted by Molich et al., 2010).

The establishment of reliable methods for quantifying both attitude and self-efficacy that we have presented in this article, and in Joyce and Kirakowski (2013, 2014), now puts us in a position to investigate to what extent it is individual differences between participants that drives such variation, and not, for instance, lack of precision in measurement practice or the use of poor or unstandardized measurement tools. However, this is at present a hypothesis that requires testing in well-differentiated application areas.

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Mary Joyce's research, which arose from her Ph.D studies, is concerned with the measurement of Internet attitudes and Internet self-efficacy and the use of such scales in usability evaluation practice. She is also interested in using these scales to examine demographic differences (e.g. age, gender) in online environments. Dr. Joyce intends to promote GIAS and the ISES through uxp.ie, the User Experience Solutions website.

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APPENDIX A

TABLE A1
General Internet Attitude Scale: 21 Items and Corresponding Subscales

Item	Internet Affect	Internet Exhilaration	Social Benefit of the Internet	Internet Detriment
15	I feel bewildered by the Internet			
19	I feel intimidated by the Internet			
5	I feel overwhelmed by the Internet			
2	The Internet makes me feel anxious			
10	The Internet makes me feel uncomfortable			
8	The Internet does not threaten me			
24	I feel at ease using the Internet			
22	I feel disheartened at the thought of using the Internet			
12	The Internet makes me feel annoyed			
20		The thought of going on the Internet is exciting to me		
9		I would like to stay on the Internet for as long as I can		
6		The idea of going on the Internet gives me a thrill		
14			The Internet makes a great contribution to human life	
11			The use of the Internet is enhancing our standard of living	
21			The Internet is bringing us into a bright new era	
1			The Internet makes a positive contribution towards society	
25			The Internet is responsible for many of the good things we enjoy	
4			The Internet makes life more efficient	
16				Using the Internet is harmful to people
13				The Internet is dehumanising to society
2				Using the Internet can cause health problems

APPENDIX B

Internet Self-Efficacy Scale

How often do you do the following activities on the Internet?

	Never	*Rarely*	*Sometimes*	*Often*	*Very often*
Communication					
Social networking/Personal involvement					
Obtaining information					
Entertainment/Media consumption					
Shopping/Buying items					
E-commerce					
Booking events /trips					
Financial services					
Blogging/Contributing to websites/Discussion boards					
Education and training					

How confident do you feel that you can do each of the following Internet activities as of now?

	Not at all confident	*Slightly confident*	*Somewhat confident*	*Moderately confident*	*Considerably confident*	*Very confident*	*Completely confident*
Communication							
Social networking/personal Involvement							
Obtaining information							
Entertainment/media consumption							
Shopping/buying items							
E-Commerce							
Booking Events/trips							
Financial services							
Blogging/contributing to websites/ discussion boards							
Education and training							