Fear of Missing out predicts Employee Information Security Awareness above Personality

traits, Age, and Gender.

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# Abstract

The role of human factors in employee information awareness has garnered increased attention, with many researchers highlight a pr al link between problematic technology use len t study aimed to present additional evidence and poorer online safety and security. T e p for this by exploring the relationship between of Fear of Missing Out (FoMO) and information security awareness (ISA) in employees. A total of 718 participants completed an online questionnaire that included measure of FoMO, ISA, as well as the Big Five personality inventory. Partici nts who reported higher levels of FoMO had lower overall ISA, as well as ledge, a more negative attitude, and engaged in risker behaviours in having poor FoMO was also demonstrated to be the largest single negative predictor for rela ISA, a ove that of age, gender, and the key personality traits tested. The potential reasons for the influence of FoMO over ISA are discussed, as well as the implications for organisational information security.

# **Key Words**

Information Security Awareness; Fear of Missing Out; Personality Traits.

### Introduction

In the context of organisational cybersecurity the human component has often been viewed critically, often being referred to as the 'weakest link'<sup>1-4</sup>. However, there has been a growing appreciation that employees may provide the best defence against compromising cyberattacks so long as they are properly motivated and trained <sup>1,5,6</sup>. Improving the information security awareness (ISA) of employees within any organisation is critical to protecting the or isation from a variety of threats, including loss of sensitive data and direct attacks on the ′. In order to develop more effective and engaging training, a better understanding of the individuating factors that may lead employees to take fewer risk ir online safety and security is of critical importance. One concept that has been previously linked to increased risk taking and increased vulnerability online is that of Fear of Mixing Out (FoMO)<sup>8,9</sup>. Briefly, FoMO relates to a pervasive anxiety which is acerbated when an individual feels that they are missing out on rewarding social experiences leca se they cannot get online  $^{10}$ . In the context of the present study it is suggested that AIS ourd drive an individual to take more risks with their online safety and security, is noring accepted ISA rules and protocols. The current study also considers the role of age, sex and personality traits (which have been shown to present predictive value) along de PoMO on information security awareness, with the aim of taking this topic one

# Hun a. Factors and Information Security Awareness

The concept of ISA has two essential components: the first relates to the level of knowledge the individual employee has about acceptable use of IT and associated security policy <sup>11</sup>. The second aspect is the extent to which the individual is committed to these principles and how well their behaviour aligns with the current guidance <sup>11</sup>. It is the latter aspect of ISA that lends

itself to being explored in terms of individual differences as it is these that may directly influence the uptake of accepted practices and behaviours related to such.

Previous research exploring the role of human factors in the context of ISA has tended to focus on generic personality traits and risk taking behaviours <sup>12</sup>. A growing body of work that has begun to focus directly on factors associated with artefacts linked to modern daily lineand the growth in the use of digital technology. For example, both internet addiction and cyberloafing have been demonstrated to have a significant impact on employee ISA <sup>13</sup> (those individuals who experienced higher levels of internet addiction, and who energed inforce extreme forms of cyberloafing (watching online pornography or updating personal websites during work time) were more likely to have poorer ISA. These findings sugged that individuals who have problematic attachment to the internet and associated platforms (e.g., social media, online gaming, and online gambling), in order to stay online, they take more risks with not only their own cybersecurity, but also that of the organisation that they work for.

FoMO has been previously enceptualised as an ostensibly socially driven phenomenon, with individuals displaying in increased propensity to seek more rewarding social experiences online <sup>14</sup>. It has also been suggested that this drive to seek out rewards via online interactions may in turn hear that individuals with higher levels of FoMO are less risk averse <sup>8,14</sup>. Indeed, many social information online, which increases potential online vulnerability of those with high FoMO <sup>8,15,16</sup>. Other studies have noted that among adolescents, higher levels of FoMO served as a significant predictor for online risk taking, including sharing intimate images, sharing passwords, and friending strangers on social media platforms <sup>9</sup>. FoMO has also been associated with a possible state of addiction, particularly in the context of social media use <sup>17</sup>, as well as

problematic smartphone use <sup>18</sup>, and distracted learning <sup>10</sup>. Apart from that, the concept of 'selfregulation limbo'  $^{8,10}$  - a process leading to individuals spending an increased amount of time online in order to engage in an affirmation of their self-identity as well and enhancing their self-esteem, has been previously linked to FoMO. This patterns of psychological needs and motivation described above could lead to individuals over-sharing their personal information <sup>8</sup>, which may in turn be linked to a disregard for sensitive company data.

#### **Aims and Objectives**

The current research aimed to further explore the link between Fol formation security awareness. FoMO has been associated with a number of antecedem, that could preclude an individual to have poorer ISA. These factors include increased ink taking, problematic use of the internet (related to social media use), and a propersity for oversharing information. All these facets of FoMO have the potential to dere e ISA in the individual as they attempt to overcome the anxiety related to being disconnected from the internet and social media platforms. It is assumed that an individual who experiences higher levels of FoMO would be more likely to ignore information security advice in order to get online, therefore leading to poorer information security invareness. In the context of the current paper, it is therefore ose adividuals who experience higher levels of FoMO would have poorer hypothesized that • will act as a significant predictor for ISA. ISA, therefor

# Methods

### **Participants**

In total 718 participants aged between 18 and 64 years (M = 38.87; SD = 12.45) were recruited to take part in the current study through Qualtrics Participants Panels, and completed an online questionnaire. Participants were paid a small honorarium for taking part in the study (£4.50).

The sample consisted of 49% male participants, with 97% stating that they were working fulltime, and 3% part-time. Participants also used computer-based technology for at least one and three-quarter hours of their working day and had either formal or informal knowledge of rules governing IT use in the workplace.

### Materials

The following self-report measures were used in the current study.

# The Human Aspects of Information Security Awareness Scale (Thills Q

As a measure of ISA, this study used the HAIS-Q <sup>11,19</sup>. All of the questions in this section were answered on a five-point Likert-type scale (1 = Strongly Diagree; 5 = Strongly Agree). Cronbach's alphas for Knowledge, Attitude and Belavour ( $\alpha_{\text{Knowledge}} = 0.91$ ;  $\alpha_{\text{Attitude}} = 0.94$ ;  $\alpha_{\text{Behaviour}} = 0.93$ ) were similar to previously reported values <sup>11</sup>. Possible scores for the subscales range from 21-105, with possible total scores for the HAIS-Q ranging from 63-315. Higher values indicate a more positive engagement with ISA.

# FoMO scale

Fear of missing or was assessed using the 10-item Fear of Missing Out Scale (FoMOs; <sup>10</sup>). Participants were used to rate statements on missing out on important information and fears relating to friends having more rewarding experiences than themselves. Internal reliability was  $\alpha = .91$  in line with previous values <sup>10</sup>. Higher scores indicate higher levels of FoMO.

# **Big Five Personality Inventory (BFI).**

Thr BFI, a 44-item inventory that measures an individual's personality, across five key dimensions (Extraversion, Agreeableness, Neuroticism, Openness, and Conscientiousness; <sup>20</sup>)

was used to asses broader personality traits. Items were scored on a five-point Likert-scale (1 = Strongly Disagree; 5 = Strongly Agree). The stability of such personality traits in an adult population has been previously demonstrated <sup>21</sup>. In the context of the present study, the BFI was used to explore the relationships between individual personality constructs and ISA, and not as a conclusive measure of personality. Cronbach's alphas over > .70 on all dimensions where found ( $\alpha$  Extraversion = 0.73;  $\alpha$  Agreeableness = 0.71;  $\alpha$  Conscientiousness = 0.77,  $\alpha$  Neurotice = 0.77;  $\alpha$  Openness = 0.70).

#### **Data Analysis**

All statistical tests were conducted using SPSS (version 25).

### Results

Descriptive statistics for the key factors and Pearson's correlations are shown in Table 1, where n = 718. A significant positive correlation between scores on the HAIS-Q and age was noted (r = .380, p = .000), and resonate well with previous research demonstrating a link between ISA and age <sup>12,22</sup>. In terms of the personality traits, both agreeableness (r = .491, p < .001) and conscientiousness (r = .670, p < .001) had moderate positive correlations with scores on the HAIS-Q, again supporting previous research in this area <sup>12</sup>. Finally, FoMO was moderately negatively correlated with total scores on the HAIS-Q (r = -.542, p < .001) as well as with each or the sub-scales related to ISA knowledge (r = -.539, p < .001), attitude (r = -.512, p < .001) and behaviour (r = -.521, p < .001).

#### [Table 1 about here]

Independent samples t-test were conducted to examine sex differences in FoMO and total HAIS-Q scores. There was no significant difference between males (M=26.90, SD=9.82) and females (M=27.66, SD=8.76) for scores on the FoMOs (t (699.784) = -1.098, p > .05). There

was also no significant difference between males (M=238.71, SD=47.12) and females (M=245.15, SD = 45.75) for total scores on the HAIS-Q (t (719) = -1.856, p > .05).

To determine if FoMO can predict participants' HAIS-Q scores, over and above general personality traits, a three-stage hierarchical multiple regression was conducted. In line with previous research, age and gender were entered at stage one of the regression to treatrol for these variables <sup>12,22,23</sup>. Personality factors were entered in stage two, again aligned with previous research in this area <sup>12</sup>. Lastly, FoMO was entered into the final stage of the midel given the limited research evidence related to the impact of this factor on FA. The Durbin-Watson statistic was 1.99, suggesting that independence of errors could be assumed, and values of tolerance and VIF suggested that multicollinearity was not a uncern (VIF average = 1.42, tolerance average = 0.73).

The results of the regression are displayed in Table 2. In the first stage, with age and gender as the key predictors, the model expanded 19% of the variance in total HAIS-Q scores. In stage two, an additional 25% of variance in HAIS-Q scores was accounted for, with openness to experience failing to be a significant predictor (p > .05). In the final stage, FoMO accounted for an additional % of the total variance in HAIS-Q scores. In total, the key variables accounted 50% of the variance in scores on the HAIS-Q. Age, sex, agreeableness, constructions, neuroticism and FoMO were all significant predictors in the final model with FMO being the most influential single predictor.

### [Table 2 about here]

#### Discussion

The aim of the present study was to examine the relationship between FoMO and ISA. Given that previous research had highlighted links between the need to stay online, risk taking, and oversharing of information, it was hypothesized that higher levels of FoMO would be linked to increased risk taking, and therefore poorer ISA in employees. The results of the present study demonstrated that FoMO acted as the most influential single predictor for **I** when personality factors and key demographic variables were controlled for. The following section will seek to summarise the key findings of this study, whilst making sore suggestions for further research.

### FoMO and ISA

Overall, the results from the current study demonstrate that those individuals who self-reported higher levels of FoMO are less engaged in information security awareness in the workplace. Specifically, they have poorer knowledge in regards to ISA, a more negative attitude towards it, and engage in behaviours that yould joopardise organisational information security. There are a number of potential reasons why FoMO enacts such an influence over ISA. Predominately, individuals who exhibit higher levels of FoMO could already be engaged in taking with their own online safety and security <sup>24,25</sup>. If these individuals higher levels of r Asks with their own online safety, it is assumed that this risk taking will are already taking their place of work particularly. They may indeed engage in more risky online exte to behaviours once in the workplace, a process that has been linked to the risk compensation hypothesis <sup>13,26</sup>. Such a process means that the individual will often be seen to take more risks with cybersecurity and information security in the workplace as they perceive such environments to be more protected by technological interventions (e.g. Firewalls, anti-virus software) compared to their home networks <sup>13</sup>.

The drive for the individual to stay online and remain connected to social media could in turn serve to make them override accepted policies and protocols related to organisational ISA. In a similar regard, FoMO has also been linked to individuals oversharing personal information online<sup>24</sup>, which could also include aspects of sensitive company information, including passwords, usernames etc. Previous research has noted that other activities associated with a problematic attachment to digital technology also influence the way in which t dividual le 1h approach their online safety and security within the workplace. For example, research has noted that those employees who scored more highly on a measure of p c internet use were also more likely to have poorer ISA <sup>13</sup>. Poorer ISA was also linked to the frequency of an individual engaging in cyberloafing activities, which has been shown to have an association with problematic attachments to digital technology and associated platforms, such as online gambling and gaming <sup>13,27</sup>. It would appear that any factor that serves to motivate an individual to stay online also has the cap city to override an individual's capacity to assess risk that is associated poor ISA. As Fo 10 was strongly correlated to each of the sub-scales of ISA, it would appear that this does not just impact on one aspect such as behaviour, but has a global negative impact on knowledge and attitude to ISA as well.

The results related to personality factors and ISA corroborate previous research in this area, with tenscientiousness and agreeableness being the most prominent and stable of the personality traits when it comes to predicting positive engagement with ISA <sup>12,22</sup>. There have been varied findings according to the impact age and sex has upon ISA, with some researchers suggesting no impact <sup>12</sup>, whereas other finding an impact for age and not sex <sup>23</sup>. The present study also indicates that age and sex play a significant role as predictors for ISA, but there was no significant differences observed for HAIS-Q scores and sex. As there have been varied

findings in this area, further research is suggested to explore potential differences in gender and ISA. In previous research, it has been suggested that younger populations are more frequently engaged in the use of digital technology, therefore increasing their potential susceptibility to cybercrime <sup>28</sup>. Aspects of impulse control have also been linked to risky online behaviours, which it turn could been linked to the age-related differences in ISA observed here <sup>29–31</sup>. The discrepancy in findings related to this factor would appear to suggest that now work also needs to be done to establish why age should impact directly on ISA, and if such finding is robust.

## Limitations and Suggestions for Future Research

The present study is not without its limitations, particula ms of the self-report nature of the measures used, especially as participants ne want to present their ideal set of behaviours when it comes to ISA in the workpla <sup>13</sup>. Even in instances where participants were assured that their responses could linked to them or their place of work, they may ot b have been reticent to provide completely truthful responses. However, as other researchers have noted, the alternative approaches to providing an objective measure for ISA are also fraught with a similar set of ssues, particularly as many ISA transgressions go unreported or undetected 7,13 revious researchers have argued against the notion that self-report eed.  $\mathbf{P}$ , and instead should be seen as valid tools for initial tests of hypotheses, studies are in and in this current study. as v

Due to correlational nature of this study, future research might also explore the relationship between FoMO and workplace information security in a longitudinal fashion. It would be also advisable to experimentally manipulate FoMO in the lab and observe subsequent online behaviour, as this would provide data for a causal inference. Disentangling what might drive the inconsistent results relating to age, sex and ISA, could also be of interest to future research.

### Conclusion

As the role of human factors in online safety and security gathers more attention, it is hoped that a growing understanding of the potential predictors for good and bad practices can be amalgamated into a clearer framework. From this, researchers, security professionals, and those who have the arduous task of protecting individuals online can start to fashion practical interventions that will go some way to ameliorating online risk. The present research has demonstrated that fear of missing out presents as an additional predictor of ISA beyond that of demographic characteristics and personality traits. Exploring was of reducing FoMO in individuals who show a higher propensity towards such behaviours may present one way of not only reducing individual anxiety, but also has the rotential to reduce the possibility of information security breaches in the workplace.

### **Author Disclosure**

No competing financial interests exist.

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|                       |        |                       |        |        |        |                           |        |        |        | X     |       |
|-----------------------|--------|-----------------------|--------|--------|--------|---------------------------|--------|--------|--------|-------|-------|
|                       | 1      | 2                     | 3      | 4      | 5      | 6                         | 7      | 8      |        | 10    | 11    |
| 1. Age                | -      |                       | -      |        | -      |                           |        | 5      |        |       |       |
| 2. HAISQ Total        | .380** | -                     |        |        |        |                           |        | ンノ     |        |       |       |
| 3. HAISQ Knowledge    | .353** | .961**                | -      |        |        |                           |        | K      |        |       |       |
| 4. HAISQ Attitude     | .363** | .977**                | .915** | -      |        |                           | X      | •      |        |       |       |
| 5. HAISQ Behaviour    | .386** | .960**                | .871** | .913** | -      | (                         |        |        |        |       |       |
| 6. Extraversion       | 043    | 050                   | 058    | 053    | 033    | $\mathbf{O}^{\mathbf{N}}$ |        |        |        |       |       |
| 7. Agreeableness      | .207** | .491**                | .487** | .469** | .468** | 15                        | -      |        |        |       |       |
| 8. Conscientiousness  | .320** | .570**                | .565** | .537** | .563*  | .156**                    | .628** | -      |        |       |       |
| 9. Neuroticism        | 308**  | 172**                 | 175**  | 150**  | 17.**  | •<br>294 <sup>**</sup>    | 319**  | 384**  | -      | -     | -     |
| 10. Openness          | .047   | .120**                | .101** | 118**  | .129** | .328**                    | .290** | .261** | 137**  | -     |       |
| 11. FoMOs             | 341**  | 542**                 | 539**  | 512**  | 521**  | .060                      | 305**  | 374**  | .293** | .036  | -     |
| Score Range (Min-Max) | 18-64  | 169-315               | 48-105 | 48-105 | 50-105 | 9-39                      | 14-45  | 13-45  | 8-39   | 15-45 | 13-53 |
| Mean                  | 38.86  | 241.99                | 79.67  | 82.06  | 80.25  | 24.92                     | 32.24  | 32.83  | 23.14  | 33.70 | 27.28 |
| SD                    | 12.46  | 46.51                 | 15.67  | 16.77  | 15.68  | 5.16                      | 5.36   | 5.73   | 5.64   | 5.38  | 9.29  |
| **p <0.01             |        | N                     |        |        |        |                           |        |        |        |       |       |
| ρ <0.01               |        | $\mathbf{X}$          |        |        |        |                           |        |        |        |       |       |
|                       |        |                       |        |        |        |                           |        |        |        |       |       |
|                       | $\sim$ | <b>V</b> <sup>°</sup> |        |        |        |                           |        |        |        |       |       |
|                       | Y      |                       |        |        |        |                           |        |        |        |       |       |
|                       | •      |                       |        |        |        |                           |        |        |        |       |       |

| (Constant)         | <b>B</b><br>164.73 | <b>SE B</b> 6.20 | del 1<br>β | t       |                 |       | Model 2 |         |                  |       | •   |          |
|--------------------|--------------------|------------------|------------|---------|-----------------|-------|---------|---------|------------------|-------|-----|----------|
|                    | 164.73             | 6 20             |            | •       | В               | SE B  | β       | t       | В                | S.B.  | β   | t        |
| Condon (Fondo - 0) |                    | 0.20             |            | 26.55** | 46.453          | 16.10 |         | 2.88**  | 103.45           | 15.07 |     | 6.60**   |
| ender (Female=0)   | 21.11              | 3.33             | .227       | 6.33**  | 9.64            | 2.9   | .10     | 3.28**  | ¥                | .12   | .19 | 6.16**   |
| ge                 | 1.71               | .13              | .46        | 12.78** | .81             | .11   | .22     | 7.39**  | 8.58             | 2.71  | .09 | 3.17*    |
| xtraversion        |                    |                  |            |         | -1.13           | .28   | 13      | -3.98** | 76               | .26   | 08  | -2.88*   |
| greeableness       |                    |                  |            |         | 2.04            | .33   | .24     | 6.23**  |                  | .30   | .19 | 5.40**   |
| onscientiousness   |                    |                  |            |         | 3.11            | .314  | .38     | 9.93**  | 2.54             | .29   | .31 | 8.66**   |
| leuroticism        |                    |                  |            |         | .59             | .28   | .07     | 2,18*   | 1.05             | .26   | .13 | 4.09**   |
| )penness           |                    |                  |            |         | 02              | .27   | 00      | 0       | .34              | .25   | .04 | 1.34     |
| юМО                |                    |                  |            |         |                 |       |         |         | -1.70            | .15   | 34  | -11.31** |
| R <sup>2</sup>     | .190               |                  |            |         | .434            |       |         |         | .521             |       |     |          |
| Adj R <sup>2</sup> | .188               |                  |            |         | .429            |       |         |         | .516             |       |     |          |
|                    |                    |                  |            |         | 77.92**         |       |         | /       | 96.372**         |       |     |          |
|                    | 83.83**            |                  |            |         | .429<br>77.92** | C     | 、       |         | .516<br>96.372** |       |     |          |