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The Effect of Resilience and Job Stress on Information Security Awareness

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1. Introduction

The weakest link in a security system is most often the human factor (Schneier, 2004). It is widely accepted, and well documented, that cyber security breaches cannot be prevented through the implementation of solely technical solutions (Furnell et al., 2006, Parsons et al., 2014, Schultz, 2005). This has been supported by security and incident reports, international security standards, and peer reviewed literature. For example, IBM Global Technology Services (2015) determined that breaches were often unintentional and that over 95% were the result of human error. Standards Australia Limited (2015) released a code of practice outlining information security controls, which recommends an emphasis on human resource security, thereby recognising the liability of the human in information security.

In recent years there has been an increased focus on better understanding the characteristics of employees and how they can affect an organisation's information security (McCormac et al., 2017c, Shropshire et al., 2006). Research has shown that organisations may reduce the risk of a security breach by 45% to 70% through improvements to employee behaviour (Wombat Security Technologies and Aberdeen Group, 2015). In line with this, the current study examined the relationships between resilience, job stress and Information Security Awareness (ISA). Essentially, it is likely that employees who are more resilient may be better at coping with job stress, and may therefore have better ISA. Throughout the following sections we introduce the main constructs considered in this study, namely, resilience, job stress and ISA.

1.1. Resilience

There is no agreement in the literature regarding the definition of the term resilience. This is primarily because it has been studied in many disciplines, including psychology, sociology, anthropology, biology, medicine, education and management. Resilience has been described a trait, process, capacity or outcome (Kossek and Perrigino, 2016, Southwick et al., 2014). For the purposes of this study, we have adopted the definition provided by the American Psychological Association (2014), which states that resilience is "the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress" (p.2). This definition suggests that resilience, as a process, is strongly influenced by our interactions within our environments. Resilience involves thoughts, behaviours and actions. Therefore, resilience can be learnt and developed, and it can also change and evolve (American Psychological Association, 2014).

Psychological, social, cultural and biological factors all interact and contribute to a person's overall level of resilience. As resilience is also strongly influenced by our surroundings, resilience can manifest itself differently across various environmental settings. These settings can range from individual, family, and organisational settings to societal and cultural settings. An individual may possess a high level of resilience within their family environment; however, this might not translate to their workplace setting. Not only is resilience affected by an individual's environment, but it can also change over time (Kim-Cohen and Turkewitz, 2012, Southwick et al., 2014).

Resilience research is particularly relevant to organisations, given the constantly changing nature of both work and the workforce, across a variety of employment contexts (Kossek and Perrigino, 2016). Employees need to become more resilient to successfully deal with heightened work demands, the blurring of work and non-work boundaries, and frequent technological advancements (Kossek and Distelberg, 2009, Kossek and Lautsch, 2012). Essentially, resilience in a work environment reflects an individual's capacity to adapt to adversity and withstand job demands (Kossek and Perrigino, 2016).

Research has shown that resilience is associated with a wide range of benefits. For example, resilient individuals have better physical and mental health outcomes, have happier relationships, are more independent, they are better equipped to manage stressful situations, and are also more successful in work contexts (Siebert, 2005). Resilience has been researched in specific workplace settings with a variety of occupational groups (Kossek and Perrigino, 2016, Rees et al., 2015). However, our extensive literature review found no previous research specifically exploring the relationship between the resilience and ISA of employees.

1.2. Job Stress

Organisational resilience cannot be considered independently of job stress. This is because an individual's level of resilience is a reflection of how well they manage and cope with stress. Job stress is explicitly related to an individual's job. When work demands and pressures do not match an individual's knowledge and abilities, their ability to cope is affected, and this results in job stress (Leka et al., 2003).

It has been long established that job stress has a negative impact on both physical and psychological health. Job stress can result in social problems, decreased motivation and decreased work performance (Johnson et al., 2005, Leka et al., 2003). Along with negative individual consequences, organisations may experience increased absenteeism and turnover and decreased staff performance, resulting in a direct economic cost (Leka et al., 2003). Organisational culture has been identified as a key factor in understanding how well an organisation is able to manage job stress (Leka et al., 2003).

Similar to resilience, work related stress has been extensively researched across occupations (Johnson et al., 2005). Research has also investigated technology-related stress (Al-Fudail and Mellar, 2008, Hwang and Cha, 2018, Rangarajan et al., 2005). Previous information security research has reported on the tension between the need to abide by information security policies of an organisation and just get the job done (Parsons et al., 2013, Calic et al., 2016). Information Security Experts stated that security measures are often perceived to hinder and delay work and task completion, leading employees to ignore security measures (Calic et al., 2016). This may mean that the more stressful a particular job or role, the more likely employees may be to ignore or disregard organisational information security policies, and behave in insecure ways. Although, no research has explicitly explored the relationship between job stress and ISA, within organisations these studies provide a useful starting point.

1.3. ISA and Individual Differences

ISA refers to the extent to which employees understand the significance of information security policies, rules and guidelines in their organisation and the extent to which their behaviour is congruent with these policies, rules and guidelines (Kruger and Kearney, 2006, Siponen, 2000).

This definition of ISA aligns with the Knowledge-Attitude-and-Behaviour (KAB) model. This model consists of three components: knowledge of a topic; attitude, or feelings towards a topic; and, behaviour, which is captured by what an individual does (Kruger and Kearney, 2006). This model suggests that as an employee's knowledge of information security policy, rules and guidelines increases, their attitude towards information security policy, rules and guidelines improves, and this results in better information security behaviour (Parsons et al., 2017).

Previous research has explored the relationship between ISA and individual differences. Two recent studies explored the relationship with age, gender and personality. It was found that older adults had

higher ISA scores when compared to younger adults (McCormac et al., 2017c, Pattinson et al., 2015). Although McCormac et al. (2017c) found a small significant gender difference, with females obtaining higher ISA scores than males; this was not consistent with findings from previous research (McCormac et al., 2017c, Pattinson et al., 2015). It was also found that individuals who were more conscientious and agreeable reported higher ISA (McCormac et al., 2017c, Pattinson et al., 2015). Similarly, in another study, conscientiousness and agreeableness were shown to moderate the relationship between behavioural intent and security software usage (Shropshire, 2015). In addition, it was found that those with a propensity to take fewer risks also had higher scores on ISA (McCormac et al., 2017c).

1.4. *The Current Study*

This study aims to investigate the relationship between an individual's resilience and job stress, and their ISA. As part of this aim, the study will explore how resilience and job stress relate to each of the three components of ISA, namely; knowledge, attitude and behaviour. Given previous findings relating to age and gender (McCormac et al., 2017c, Pattinson et al., 2015), and their relationship to ISA, the influence of these variables will also be analysed.

2. Methodology

Participants were asked to complete an online survey. This survey was administered through the web-based survey software Qualtrics. Ethics approval was granted by the Human Research Ethics Subcommittee of the University of Adelaide, School of Psychology. Data collection for this paper was part of a larger project. For the purposes of this paper, data analysis will focus on responses obtained from the demographic questions (age and gender), the Human Aspects of Information Security Awareness – Questionnaire (HAIS-Q) results, and responses to the Brief Resilience Scale and the Job Stress Scale.

2.1. *Participants*

A total of 1048 (535 females, 512 males and 1 gender unspecified) working Australians completed an online questionnaire. Participants had to meet three criteria to take part in this study. Individuals had to be over the age of 18, currently employed, and working in Australia.

Participants were well distributed across age categories. Approximately 12% of participants were between 18 and 29 years of age, and 24% were between 30 to 39 years of age. This left approximately 22% in the 40 to 49 age category, 23% in the 50 to 59 age category, and 19% aged 60 and over. Participants represented over 15 sectors and 8 job areas, including sales workers, clerical and administrative workers, professionals, management, labourers and technicians/trade workers.

2.2. *Measures*

2.2.1. *HAIS-Q*

ISA was measured using the HAIS-Q. This measure consists of 63 items that capture an individual's knowledge, attitude and behaviour, which constitute ISA (Parsons et al., 2017). The 63 statements are answered on a five-point Likert scale (ranging from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree'). In this study, Cronbach's alpha scores were above the recommended level of .70 for knowledge (.83),

attitude (.92) and behaviour (.90), with a Cronbach's alpha of .96 for ISA. These are consistent with alpha levels reported in previous studies (McCormac et al., 2017b, McCormac et al., 2016).

2.2.2. Brief Resilience Scale

Smith et al. (2008) developed the Brief Resilience Scale (BRS) to measure an individual's ability to recover, or bounce back, from stressful situations. This is a six-item scale, and participants are asked to respond using a five-point Likert scale (ranging from 1 = 'Strongly Disagree' to 5 = 'Strongly Agree'). A higher score on the scale represents a higher degree of resilience (Smith et al., 2008). The scale has been shown to possess good internal consistency and test-retest reliability. Analysis of the BRS in this study yielded a Cronbach's alpha of .86, which is considered reliable and consistent with previous studies (Rodriguez-Rey et al., 2016).

2.2.3. Job Stress Scale

Following the adaption of earlier work conducted by Crank et al. (1995), Lambert et al. (2006) developed the Job Stress Scale. The scale contains five items, also measured using a five-point Likert scale (1 = 'Strongly Disagree' to 5 = 'Strongly Agree'). Higher scores correspond with higher levels of job stress. An alpha level of .82 has been previously reported (Shea and De Cieri, 2011). The results of this study found the measure to have an alpha value of .87.

3. Results

Table 1 presents a correlation matrix, including mean and standard deviation scores, to examine the relationship between ISA, the three components of ISA; knowledge, attitude and behaviour, and gender, age, resilience and job stress. Data on employment sector and government vs non-government roles were examined. However, as no significant differences were found, they are not reported further.

In addition, collinearity diagnostics analysis revealed that Tolerance values were all greater than .10 and the Variance Inflation Factor (VIF) values were all well below 10, suggesting that multi-collinearity had not been violated.

Variables	Gender	Age	ISA	K	A	B	Resilience	Job Stress
Age	-.18*							
ISA	.08*	.27**						
K	.09**	.20**	.92**					
A	.08**	.28**	.96**	.82**				
B	.05	.28**	.94**	.78**	.87**			
Resilience	-.09**	.19**	.25**	.20**	.23**	.27**		
Job Stress	.03	-.19**	-.21**	-.16**	-.20**	-.25**	-.45**	
Mean	***	***	259.22	84.55	88.27	86.41	20.92	13.46
SD	***	***	33.08	11.57	11.99	11.67	4.36	4.31

* $p < .05$ (2-tailed) ** $p < .01$ (2-tailed) *** Mean and SD scores for actual age are unavailable, as age range, rather than exact ages were provided by participants.

Table 1 Correlations and descriptive statistics: ISA, Knowledge, Attitude, Behaviour, Age, Gender, Resilience and Job Stress (N = 1,048)

3.1. ISA, Age and Gender

To examine the effects of age and gender on ISA, a two-way, between subjects ANOVA, with two levels for gender (female and male) and five levels for age (i.e., '18-29', '30-39', '40-49', '50-59' and '60 years and over'), was conducted. This analysis revealed a statistically significant effect for both age, $F(4, 1047) = 28.54, p < .001, \eta_p^2 = .099$, and gender, $F(2, 1047) = 12.35, p < .001, \eta_p^2 = .023$. There was also a statistically significant interaction between the effect of age and gender on ISA, $F(4, 1047) = 3.38, p = .009, \eta_p^2 = .013$. It was observed that participants in older age brackets tended to have higher ISA scores, when compared to participants in younger age brackets.

Female participants ($M = 259.8, SD = 30.0$) were found to have significantly higher ISA scores than their male counterparts ($M = 254.5, SD = 33.9$), although the effect size was small, $d = .17$. While men had lower ISA scores than women; the difference between genders was not as large after the age of 39. Therefore, younger males had particularly low levels of ISA when compared to both older males and females. This demographic finding warrants further investigation.

3.2. Resilience, Job Stress and Knowledge, Attitude and Behaviour

Further analyses investigated the difference between participants who scored high, compared to those who scored low on the measure of resilience. We compared the scores on the three components of the HAIS-Q, namely, knowledge, attitude and behaviour.

Participants were categorised as having either high or low resilience ($M = 3.49, SD = .73$). Participants who scored two standard deviations below the maximum were classified as having a high level of resilience, and the remainder of participants were categorised as possessing low levels of resilience. Table 2, presents the means and standard deviations for participants in the high and low resilience categories.

Variables	Resilience	N	Mean	Standard Deviation
Knowledge	Low	533	81.53	12.47
	High	515	87.67	9.60
Attitude	Low	533	84.73	13.38
	High	515	91.93	9.02
Behaviour	Low	533	82.80	12.79
	High	515	90.14	8.99

Table 2 Summary of mean and standard deviation scores for high and low resilience across, knowledge, attitude and behaviour and total ISA (N = 1,048)

Independent samples t-tests revealed that there were significant differences between the two groups. Participants who had high scores on the measure of resilience had significantly higher knowledge, $t(1046) = -8.90, p < .001, d = .55$, attitude, $t(1046) = -10.18, p < .001, d = .63$, and behaviour scores, $t(1046) = 10.73, p < .001, d = .67$, when compared to those in the low resilience category. As evident by the Cohen's d measures, these differences all reflect medium sized effects (Cohen, 1992a, Cohen, 1992b).

Job stress was explored in a similar way. However, whereas resilience consisted of two categories, job stress consisted of three categories. The number of categories was purposefully selected to reflect

differences in the range of responses provided by participants. Participants were categorised as either reporting low, moderate or high job stress levels ($M = 2.69$, $SD = .86$). Participants were classified as having high job stress if their scores were two standard deviations below the maximum. Individuals were deemed to have low job stress if their scores were two standard deviations above the minimum. All other participants were allocated to having moderate levels of job stress. Mean scores and standard deviations for participants across low, moderate and high job stress categories are shown in Table 3.

Variables	Job Stress	N	Mean	Standard Deviation
Knowledge	Low	175	89.33	9.92
	Moderate	534	84.25	10.83
	High	339	82.54	12.75
Attitude	Low	175	94.15	9.36
	Moderate	534	88.08	10.75
	High	339	85.53	13.89
Behaviour	Low	175	91.99	9.33
	Moderate	534	86.77	10.62
	High	339	82.95	13.07

Table 3 Summary of mean and standard deviation scores for high, moderate and low job stress, knowledge, attitude and behaviour and total ISA (N = 1,048)

Subsequent multivariate ANOVA analysis showed that there was a statistically significant difference in ISA based on participants reported level of job stress, $F(6, 2086) = 14.24$, $p < .001$; Wilk's $\Lambda = .92$, partial $\eta^2 = .04$. In fact, tests of between-subject effects revealed that level of job stress had a statistically significant effect on, knowledge, $F(2, 1045) = 21.02$, $p < .001$; partial $\eta^2 = .04$, attitude, $F(2, 1045) = 31.67$, $p < .000$; partial $\eta^2 = .06$ and behaviour, $F(2, 1045) = 37.60$, $p < .001$; partial $\eta^2 = .07$.

Multiple comparisons with a Bonferroni post hoc test suggest that significant differences were found between participants in the low job stress group when compared to those in the moderate and high job stress groups. Overall, it was observed that individuals within the low job stress group had significantly higher scores, when compared to participants in both the moderate and high job stress groups, respectively, across knowledge ($p < .001$, $d = .49$; $p < .001$, $d = .59$), attitude ($p < .001$, $d = .60$; $p < .001$, $d = .73$) and behaviour ($p < .001$, $d = .52$; $p < .001$, $d = .80$). As shown by the Cohen's d measures, the differences between groups range from medium to large effect sizes (Cohen, 1992a, Cohen, 1992b).

Further to this, participants in the moderate job stress group had significantly higher scores than participants in the high stress group for attitude ($p < .005$, $d = .21$) and behaviour ($p < .001$, $d = .32$). The only non-significant finding was for knowledge ($p < .089$, $d = .14$). The effect size observed between the moderate job stress group and the high job stress group is much smaller than the effect size observed between the low job stress group, and the rest of the participant sample.

There were minimal differences between the three components of ISA; knowledge, attitude and behaviour, and resilience and job stress. Therefore, it was determined that for regression analysis the overall measure of ISA would be used, rather than its components.

3.3. ISA, Resilience and Job Stress

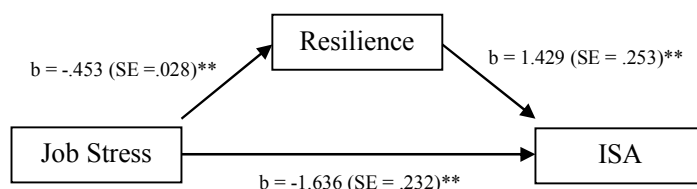
McCormac et al. (2017a) presented a two-stage hierarchical multiple regression to investigate the extent to which demographic variables predicted ISA. In line with this, and as shown in Table 4, to control for the effects of age and gender, these variables were entered at Stage 1. At Stage 2, resilience and job stress were added together, explaining a total variance of 14%. To further investigate this, we conducted a similar three-stage hierarchical multiple regression. In Stage 1, age and gender were entered. In Stage 2, resilience was entered and in Stage 3, job stress was entered, separately. As shown in Table 4, when resilience is added to the model, it explained the majority of additional variance (i.e., over 4%) after the effects of age and gender are controlled for. Adding job stress in Stage 3, explained less than one percent of additional variance.

Variable	β (standardised)	<i>t</i>	<i>p</i>
Stage 1	$F_{(2, 1047)} = 50.37$, adjusted $R^2 = .086^{**}$		
Age	.29	9.66	<.001
Gender	.13	4.40	<.001
Stage 2	$F_{(3, 1047)} = 52.34$, adjusted $R^2 = .128^{**}$		
Age	.25	8.47	<.001
Gender	.14	4.90	<.001
Resilience	.21	7.17	<.001
Stage 3	$F_{(4, 1047)} = 41.77$, adjusted $R^2 = .135^{**}$		
Age	.24	8.09	<.001
Gender	.14	4.83	<.001
Resilience	.17	5.23	<.001
Job Stress	-.10	-2.98	.003

* $p < .05$, ** $p < .001$

Table 4 Summary of the hierarchical regression analysis for age, gender, resilience and job stress predicting ISA (N = 1,048)

The hierarchical regression analysis has revealed that resilience may play an important mediating role in the relationship between job stress and ISA. This was investigated through further regression analyses, supporting the mediation hypothesis. To examine the effect of resilience as a mediator between the relationship between ISA and job stress, we conducted the Sobel test (Baron and Kenny, 1986). As shown in Figure 1, the unstandardised regression coefficients between job stress and resilience, resilience and ISA, and job stress and ISA were all statistically significant. The statistic for the Sobel test was -5.33 (SE=.121, $p < .001$) indicating that the effect of job stress is significantly reduced by an individual's level of resilience. This result has applied implications which will be discussed in the following sections.



* $p < .05$, ** $p < .001$

Figure 1 Model testing hypothesis that resilience mediates the relationship between job stress and ISA.

4. Discussion

Although there is a wide range of literature, across disciplines, exploring various aspects relating to both resilience and job stress, their relationship with ISA has not been extensively examined. Hence, the aim of this study was to empirically examine the relationship between ISA, resilience and job stress.

4.1. *Our Findings and Application*

It was found that participants who were more resilient had higher ISA, whereas participants who experienced greater job stress had lower ISA. Resilient individuals also reported lower levels of job stress, and resilience was found to mediate the relationship between job stress and ISA. This means that, even if people have high levels of job stress, if they are better able to cope with or adapt to stress (i.e., have higher resilience) their ISA is less likely to be affected. This has important implications, as it may suggest that improving employee resilience could reduce an organisation's level of vulnerability.

When looking at the components that constitute ISA, namely, knowledge, attitude and behaviour, it was observed that participants who reported high levels of resilience also reported significantly better knowledge, attitude and behaviour. In a similar pattern, participants who reported lower levels of job stress had significantly higher levels of overall ISA, in conjunction with higher levels of knowledge, attitude and behaviour. These differences were observed across all three levels of reported job stress. As job stress decreased participant's knowledge, attitude and behaviour significantly improved. The greatest differences were observed between participants in the low job stress group when compared to the high job stress group. However, benefits were clearly observed even for participants in the moderate job stress group as compared to those in the high job stress group.

This study's approach of classifying an individual's level of resilience, as either high or low, along with similarly classifying their level of job stress, as either low, moderate or high, has practical advantages for organisations. It would enable organisations to identify employees who have low levels of resilience, in conjunction with high and moderate levels of stress. These employees would benefit from training and education programs to foster their resilience. This approach guarantees that employee training needs are correctly identified, and ensures that organisations use their resources efficiently, allocating training funds to maximise benefits to individuals.

Most importantly, this research was able to demonstrate that resilience mediated the relationship between job stress and ISA. What this means is that if organisations are able improve an employee's level of resilience then that employee's level of job stress is less likely to result in lower levels of ISA. This is because being more resilient enables them to better manage and cope with job stress.

Previous research has shown that resilient individuals are more successful in work environments; they are better able to deal with heightened work demands and are therefore more adept at managing stressful situations (Siebert, 2005). Resilient employees are also better able to cope with technological changes and advancements (Kossek and Lautsch, 2012, Kossek and Distelberg, 2009). This research supports the positive effect of resilience, showing that resilient individuals have better ISA and ultimately more secure behaviour.

Conversely, previous research has indicated that individuals experiencing job stress have poorer work performance (Johnson et al., 2005, Leka et al., 2003). This present study revealed that individuals who reported higher levels of job stress also had lower levels of ISA. This could be because individuals

who are experiencing higher levels of job stress, due to various work demands, may also have less time to focus on other organisational demands, such as practicing good information security behaviours, resulting in a less secure environment. Likewise, under stressful situations individuals are more likely to take ‘short cuts’ to get the job completed. This may be particularly true for overload scenarios and these ‘short cuts’ may include non-compliance to information security policy. This research was able to illustrate that any reduction in reported job stress was beneficial, as it was shown to significantly improve ISA. Another possible interpretation may relate to cultural factors. For example, perhaps an organisation that is responsive to employees’ needs and abilities is also more likely to provide employees with better ISA training, ultimately making staff feel valued and less stressed.

Previous research has shown that resilience can be learnt and developed (American Psychological Association, 2014). By helping individuals to become more resilient, they will become better equipped to cope with job stress. This has implications for training programs. Organisations have the opportunity to teach their employees strategies and skills to increase their resilience and decrease their job stress, and thereby improve the ISA of their employees.

4.2. *Limitations and Future Directions*

This study relied on the collection of questionnaire-based, self-reported data. Although self-report data collection does provide valuable data, it can be affected by self-report biases, including social desirability bias (Spector, 1994). These biases may result in measurement error. Therefore, to reduce the effect of such biases, confidentiality and anonymity of responses was guaranteed.

Given that resilience and job stress had not been previously researched in this context, the measures used to capture these constructs, were both brief measurement tools. Resilience was measured using a six-item scale (Smith et al., 2008) and job stress was measured using a five-item scale (Lambert et al., 2006). Although both measures have been shown to be reliable, future research could use more comprehensive measures of both resilience and job stress. This would provide a more robust measure of these variables and their impact on ISA.

Building on the present study, it is recommended that future research examine the relationship between ISA, resilience, and job stress, with an emphasis on exploring the direction of causality.

This current research has shown that resilience and job stress levels have a significant relationship with knowledge, attitude and behaviour. Previous research has also shown that organisational culture can have a significant impact on the management of job stress (Leka et al., 2003). Therefore, there is an opportunity to examine what effect the interaction between organisational culture, resilience, job stress and ISA, may look like. Empirical research exploring the interactions between these variables would be of great interest to both the research community and to organisations. Although there is a great deal of literature exploring the benefits of resilience within organisations there is no research exploring the impact of building a resilient workforce that has the potential to reduce job stress and improve security culture, thereby, contributing to significant improvements in ISA.

5. **Conclusion**

This study empirically examined the relationship between ISA, resilience and job stress. It was found that individuals who were more resilient also reported lower job stress, and had better ISA, across all three components of ISA, knowledge, attitude and behaviour. It was also observed that as job stress

decreased, ISA improved. It was shown that resilience played a mediating role in the relationship between job stress and ISA.

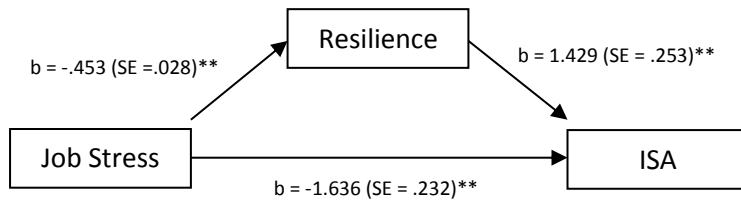
These findings have important theoretical and applied implications. From a practical perspective, organisations may benefit from incorporating training programs that focus on resilience training, in an effort to create a more resilient workforce. There are numerous benefits associated with having resilient employees, these benefits may extend to improvements in ISA and reductions in job stress. Theoretically, these initial findings can be used as a foundation for future research to investigate, more comprehensively, the impact of resilience and job stress in an effort to empirically ascertain causation. Essentially, it provides an opportunity for future research to determine the interaction and the effect of both organisational culture and, more specifically organisational security culture, on resilience, job stress and ISA.

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* $p < .05$, ** $p < .001$

Tables and Figures

Variables	Gender	Age	ISA	K	A	B	Resilience	Job Stress
Age	-.18*							
ISA	.08*	.27**						
K	.09**	.20**	.92**					
A	.08**	.28**	.96**	.82**				
B	.05	.28**	.94**	.78**	.87**			
Resilience	-.09**	.19**	.25**	.20**	.23**	.27**		
Job Stress	.03	-.19**	-.21**	-.16**	-.20**	-.25**	-.45**	
Mean	***	***	259.22	84.55	88.27	86.41	20.92	13.46
SD	***	***	33.08	11.57	11.99	11.67	4.36	4.31

* $p < .05$ (2-tailed) ** $p < .01$ (2-tailed) *** Mean and SD scores for actual age are unavailable, as age range, rather than exact ages were provided by participants.

Table 1 Correlations and descriptive statistics: ISA, Knowledge, Attitude, Behaviour, Age, Gender, Resilience and Job Stress (N = 1,048)

Variables	Resilience	N	Mean	Standard Deviation
Knowledge	Low	533	81.53	12.47
	High	515	87.67	9.60
Attitude	Low	533	84.73	13.38
	High	515	91.93	9.02
Behaviour	Low	533	82.80	12.79
	High	515	90.14	8.99

Table 2 Summary of mean and standard deviation scores for high and low resilience across, knowledge, attitude and behaviour and total ISA (N = 1,048)

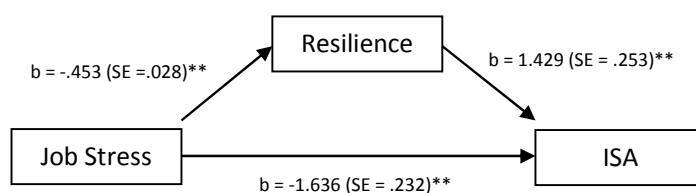
Variables	Job Stress	N	Mean	Standard Deviation
Knowledge	Low	175	89.33	9.92
	Moderate	534	84.25	10.83
	High	339	82.54	12.75
Attitude	Low	175	94.15	9.36
	Moderate	534	88.08	10.75
	High	339	85.53	13.89
Behaviour	Low	175	91.99	9.33
	Moderate	534	86.77	10.62
	High	339	82.95	13.07

Table 3 Summary of mean and standard deviation scores for high, moderate and low job stress, knowledge, attitude and behaviour and total ISA (N = 1,048)

Variable	$\beta(\text{standardised})$	t	p
Stage 1	$F_{(2, 1047)} = 50.37$, adjusted $R^2 = .086^{**}$		
Age	.29	9.66	<.001
Gender	.13	4.40	<.001
Stage 2	$F_{(3, 1047)} = 52.34$, adjusted $R^2 = .128^{**}$		
Age	.25	8.47	<.001
Gender	.14	4.90	<.001
Resilience	.21	7.17	<.001
Stage 3	$F_{(4, 1047)} = 41.77$, adjusted $R^2 = .135^{**}$		
Age	.24	8.09	<.001
Gender	.14	4.83	<.001
Resilience	.17	5.23	<.001
Job Stress	-.10	-2.98	.003

* $p < .05$, ** $p < .001$

Table 4 Summary of the hierarchical regression analysis for age, gender, resilience and job stress predicting ISA (N = 1,048)



* $p < .05$, ** $p < .001$

Figure 1 Model testing hypothesis that resilience mediates the relationship between job stress and ISA.