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IMPOSTOR PHENOMENON IN INFORMATION TECHNOLOGY

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ABSTRACT

Science, Technology, Engineering and Math (STEM) career fields have been criticized for their lack of diversity. Frequently, the lack of female representation in STEM fields was blamed on widely publicized issues such as the glass ceiling, work life balance, and unfair pay. One area never researched, but potentially an alternative concern, was the Impostor Phenomenon (IP). IP is an experience of intellectual fraudulence despite measured success manifesting in denial of one's competencies, fear of failure, perfectionism, and difficulty owning and enjoying success. This study investigated potential differences of the IP among IT professionals within specific categories of demographics such as gender, age, and level of education. Using a quantitative, non-experimental, causal-comparative design, this research study provided comparisons on the dependent variable of IP between the specific independent variable groups of (a) gender, (b) age, and (c) level of education. In addition, a three-way (2x4x4) ANOVA examined group comparisons further by including analysis of the interactions between the groups of these three variables. The only independent variable that provided statistically significant results was age. The categories for age were 30 to 44, 45 to 60, and over 60. Based on the data, as an IT employee became older and gained expertise, the employee experienced less episodes of doubt, to include fear of failure. Based on the results of this study, the four areas of importance for a successful organization, as it relates to managing IT professionals, were determined to be motivation, confidence, acceptance, and communication.

Keywords: Impostor Phenomenon, gender, age, education, quantitative, information technology, management

INTRODUCTION

Technical career fields such as Science, Technology, Engineering, and Math (STEM) are especially scrutinized for their low number of female professionals when compared to the number of males. In addition, age and level of education are also perceived to influence an individual's ability to succeed in a STEM environment (Chen, 2005; Fried-Buchalter, 1997; Akande, 1993). Overall, there is a perception that men and women are not of equal level of experience or expertise in the fields of Information Technology (IT) and Organization and Management as it applies to managing an IT workforce (Kanwar, Singh, & Kodwani, 2012; Michie, & Nelson, 2006). The Current Population Survey illustrates that, while there are significant advances for women, men are still compensated at a rate of 18% higher than women (United States Census Bureau, United States Department of Labor [Bureau of Labor Statistics], 2013).

A common viewpoint associated with gender suggests that women are naturally inferior to men when it comes to intelligence or general understanding within male dominated academic pursuits or career choices.

These ideas have also developed into the popular perception that exaggerating intelligence of males, by their own admission or by that of a colleague or relative, supports the generalization that men frequently overestimate their level of intelligence and education. On the other hand, research also lends itself to the idea that women are more than likely to minimize their level of understanding within technical occupations or educational pursuits so as not to draw attention to the fact that they are underrepresented in these common settings (Campion & Maertz, 1998; Furnham & Gasson, 1998; Furnham & Rawles, 1995; Hogan, 1964).

A primary reason for the disparity is still unknown. However, research by Dr. Pauline Clance introduced the Impostor Phenomenon (IP) and presented the idea that some people believe others view them as more competent and accomplished in their work than they perceive themselves to be (Kruger & Dunning, 1999; Clance, 1985; Clance & Imes, 1978). This implied there is another area of consideration to be investigated to determine any dependencies between the low number of female professionals in comparison to the number of males in the field of IT: the potential influence of IP. To aid in understanding this relationship, this study investigated potential differences of the IP among IT professionals within specific categories of demographics such as gender, age, and level of education.

THE IMPOSTOR PHENOMENON

In general, the term Impostor was often used to describe individuals who present themselves in a way that contradicts their true persona. The questions often asked are what makes these individuals misrepresent themselves, is the misrepresentation intentional or committed unconsciously and what research has been done that can provide insight to the mindset of these individuals so their behavior can be better understood? Some areas of consideration present in the literature include superiority biases, self-presentation strategy, self-awareness, confidence, cognitive domains, schizotypal personality, illusory superiority, and the Dunning-Kruger effect. These works are aligned with the Impostor pretense and propose different interpretations to its expansion. Each work adds perspective to proven variations in prior research, contributing to settings in which *Impostorism* flourishes while also validating diverse reasons why Impostors exist.

The Impostor Phenomenon is defined as an experience of intellectual fraudulence despite measured success manifesting in denial of one's competencies, fear of failure, perfectionism, and difficulty owning and enjoying success (Clance, 1985; Clance & Imes 1978). Research, specific to IP and its possible effect on IT (Dasgupta, 2011), indicated consistent exposure to female experts or past correlations of the phenomenon in a STEM career field may lead to an increase in the number of women pursuing careers in these areas. However, the focus of Dasgupta's research (2011) did not provide a tie to their potential experience with IP.

Dr. Pauline Rose Clance is a psychotherapist who dedicated the majority of her career to working with women in a clinical setting. In 1973, twenty-six years prior to the publicizing of the Dunning-Kruger effect, Clance began a five-year study that focused on high-achieving women (Clance & Imes, 1978). During that five-year span, 150 women were treated for being Impostors. Those women exhibited behavior that indicated they did not feel intelligent or accomplished in their careers. However, the achievements of each woman indicated a differing perspective. The women were highly educated and some had achieved doctoral degrees. Despite their proven success or above average level of training, these women still felt they were not capable of achieving recognition for their efforts and saw themselves as Impostors.

Through her research, Clance identified two different groups of women and four different types of behaviors that are prevalent among those who suffer from the IP. She created the Clance Impostor Phenomenon Scale (CIPS) to measure the level of IP experienced by the women in her clinical study. This research provided the first-ever look at a new perspective that can help provide a better understanding of internal factors that might affect a woman's ability or inability to succeed in a competitive environment.

Impostor Phenomenon Groups

Two groups of women were identified as experiencing the IP. The first group was comprised of women who had siblings or relatives that they were frequently compared to in terms of their intellect (Clance & Imes, 1978). The women with IP took on what they saw as an unreachable task of proving they were actually as smart as or smarter than the family member to whom they feel consistently compared. Holloway and Hess (1982) presented the idea that mothers' acknowledgements are influenced significantly by the gender of their child. From a very early age, mothers believe daughters are less competent in math than sons. Research by Stout, Dasgupta, Hunsinker, and McManus (2011) and Clance and Imes (1978) expressed long standing bias towards gender within family settings. That conclusion was especially notable because the mothers in one study believed their sons were more intelligent in

STEM areas than their daughters, long before either child participated in elementary education opportunities (Stout et al., 2011). In addition to not feeling as smart as their relative or sibling, these women also lived with the idea of being labeled as sensitive by their family. In most cases, the women in this group went to great lengths to achieve high academic pursuits starting at a very young age. Their attempts to show everyone they were intelligent were partly due to the perceived sibling rivalry as well as their own innate feelings of believing they were not intellectually inclined. The thoughts that their family members may be correct led to women in this group experiencing their very first bout with IP.

The second group was comprised of women who were told from a very early age that they were superior in every way, extremely intelligent, and capable of achieving anything they set their mind to (Clance & Imes, 1978). Family gatherings were filled with discussion about how great these women were and had been since birth. They were described as always doing well and achieving difficult tasks with ease. Despite the family's perception of these women being near perfect, the women themselves, had begun to experience things that diminished this perception. For example, as the women began school, they noticed they couldn't complete their assignments and receive high marks without studying as their parents expected. These types of events sent this group of women into a frenzy at a very early age. The women in this group began to hide their true perception of themselves—unintelligent yet expected to maintain their family's ideal of their brilliance and ability to master anything with minimal effort (Clance & Imes, 1978). Within both groups of women, a level of phoniness was created. How each woman managed her experiences of IP was further broken down into four specific behaviors.

Impostor Phenomenon Behaviors

Behavior 1 describes a woman who focuses her efforts towards diligence and hard work. These women live in fear of someone discovering their lack of intelligence (Clance & Imes, 1978). Behavior 2 indicates a woman who exhibits a sense of phoniness that is partially based on her reality of being fake, but trying her best to cover it up. These women frequently keep their true opinions and ideas to themselves facilitating their mask of phoniness and ensuring they remain in unison with their peer group. (Clance & Imes, 1978). Behavior 3 includes women who use charm and perceptiveness to gain favor among their supervisors or leadership within their organization. These women believe their charm enhances their ability to be liked as well as to be recognized as special and intellectual. Behavior 4 describes women who perceive that successful women are viewed negatively. These women expect to be disliked if they display too much confidence in their own ability to lead or successfully complete tasks that are naturally male dominated traits (Clance & Imes, 1978).

Clance Impostor Phenomenon Scale (CIPS)

After her clinical study, Clance developed the CIPS, which is comprised of 20 multiple choice questions. Each response to a question has a Likert-based score associated with it that ranges from one to five. To determine a person's IP score, the numbers associated with the response chosen by the participant are totalled. The scales were broken down into three separate groups. The CIPS scoring makeup was a combination of four separate levels of IP experiences.

1. Group 1: Score of 40 or less. Implies the participant has few IP experiences.
2. Group 2: Score between 41 and 60. Implies the participant has moderate IP experiences.
3. Group 3: Score between 61 and 80. Implies the participant has frequent IP experiences.
4. Group 4: Score of 81 or more. Implies the participant has intense IP experiences (Clance, 1985).

STUDY DESIGN

The study investigated potential differences in IP among IT professionals within specific categories of demographics, including gender, age, and level of education. Using a quantitative, non-experimental, causal-comparative design allowed for comparisons on the dependent variable of IP between the specific independent variable groups of (a) gender; (b) age involving four levels (18 to 29, 30 to 44, 45 to 60, and over 60); and (c) level of education involving four levels (high school, some college, associate or bachelor degree, and graduate degree). A three-way (2x4x4) ANOVA took these group comparisons further by including analysis of the interactions among the groups of these three variables. Including the interaction effects allowed for a comparison of the effects within the different levels (Pallant, 2013) of gender, age, and/or education level. The chosen analysis allowed for further probing into potential responses to the research question rather than simply analyzing the isolated main effects of the independent variables.

Research Questions and Hypotheses

The research question sought to determine if there are potential differences of the IP in IT professionals within specific categories of demographics such as

gender, age, and level of education. Hypothesis testing began with the three-way interaction. If significance was found in the three-way interaction, then the levels within the interaction were further investigated. If significance was not found in the three-way interaction, then the three two-way interactions were investigated.

For two-way interactions in which significance was found, the levels within the interaction(s) were further investigated. For two-way interactions in which significance was not found, the main effects that were not part of a significant two-way interaction were investigated. For investigated main effects in which significance was found, the relationship between groups was investigated further. For investigated main effects in which significance was not found, investigation ceased. The *p*-value was used to test the null hypotheses, with a *p*-value of 0.05 or less signifying differences that were significant (Norusis, 2013). No other demographic data was collected.

Null hypothesis 1 ($H_0 1$). There is no significant three-way interaction effect on the dependent variable of IP among the levels of the independent variables of (a) gender, (b) age, and (c) level of education.

Alternative hypothesis 1 ($H_a 1$). There is a significant three-way interaction effect on the dependent variable of IP among the levels of the independent variables of (a) gender, (b) age, and (c) level of education.

Null hypothesis 2 ($H_0 2$). There is no significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) gender and (b) age.

Alternative hypothesis 2 ($H_a 2$). There is a significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) gender and (b) age.

Null hypothesis 3 ($H_0 3$). There is no significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) gender and (b) level of education.

Alternative hypothesis 3 ($H_a 3$). There is a significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) gender and (b) level of education.

Null hypothesis 4 ($H_0 4$). There is no significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) age and (b) level of education.

Alternative hypothesis 4 ($H_a 4$). There is a significant two-way interaction effect on the dependent variable of IP between the levels of the independent variables of (a) age and (b) level of education.

Null hypothesis 5 ($H_0 5$). There is no significant main effect on the dependent variable of IP between the levels of the independent variable of gender.

Alternative hypothesis 5 ($H_a 5$). There is a significant main effect on the dependent variable of IP between the levels of the independent variable of gender.

Null hypothesis 6 ($H_0 6$). There is no significant main effect on the dependent variable of IP among the levels of the independent variable of age.

Alternative hypothesis 6 ($H_a 6$). There is a significant main effect on the dependent variable of IP among the levels of the independent variable of age.

Null hypothesis 7 ($H_0 7$). There is no significant main effect on the dependent variable of IP among the levels of the independent variable of level of education.

Alternative hypothesis 7 ($H_a 7$). There is a significant main effect on the dependent variable of IP among the levels of the independent variable of level of education.

Sample

All IT professionals who were registered with SurveyMonkey Audience were invited to participate. Only those members who also agreed to answer the demographic questions, IP scale, and met inclusion criterion, however, were included in the study. The inclusion criterion called for seven years of tenure in the field of IT.

Sample Size

Power analysis was performed using G*Power 3.1.9.2 for a three-way (2x4x4) ANOVA. Power analysis was performed for each of the main effects and interactions to be tested in this study. Due to the different numerator degrees of freedom values associated with each of the tests, a total of three power analyses was performed.

The first analysis was performed to account for the main effect of gender. Power analysis used a power of .80, an alpha of .05, a medium effect size of $f = 0.25$, numerator degrees of freedom as 1, and a total number of groups set to 32. Results of this power analysis indicated that a sample of size $N = 129$ was necessary to test the main effect of gender.

The second analysis accounted for the main effects of age and level of education, as well as the two-

way interaction effects between gender and age and gender and level of education. Power analysis used a power of .80, an alpha of .05, a medium effect size of f = 0.25, numerator degrees of freedom as 3, and a total number of groups of 32. Results of this power analysis indicated that a sample of size N = 180 was necessary to test the main effects of age and level of education, as well as the two-way interaction effects between gender and age, and gender and level of education.

The final analysis accounted for the two-way interaction effect between age and level of education, as well as the three-way interaction effect among gender, age, and level of education. Power analysis used a power of .80, an alpha of .05, a medium effect size of f = 0.25, numerator degrees of freedom as 9, and a total number of groups of 32. Results of this power analysis indicated that a sample of size N = 260 was necessary to test the two-way interaction effect between age and level of education and the three-way interaction effect among gender, age, and level of education.

The largest of the three power analyses was chosen as the minimum sample (N = 260) to ensure the study is powered for each of the tests. For this study a sample of size N = 300 or greater was sought to protect the study from loss of power due to missing or incomplete data.

Instruments/Measures

Two instruments were used in the data collection process: A Researcher-Designed Demographic Questionnaire (RDDQ) and the CIPS. The RDDQ was used to collect the necessary demographic data including gender, age, and level of education. The CIPS was used to quantify the presence of the IP within participating IT professionals. Items on the CIPS were scored using a 5-point Likert scale as follows: 1 = not at all true; 2 = rarely true; 3 = sometimes true; 4 = often true; and 5 = very true.

Data Collection

Participants were recruited and completed data collection through Survey Monkey Audience. Participants were pre-screened for tenure of seven years in the field of IT. Those who met the tenure requirement completed the RDDQ followed by the CIPS. The CIPS was presented in the form of survey questions. Results were analyzed for differences in IP levels for the categories of gender, age, and level of education.

Data Analysis

Initial calculations (i.e., cross tabulations) were made in SurveyMonkey during data collection, with additional calculations using SPSS. Frequencies and percentages were provided for nominal independent variable data (gender, age and level of education), while measures of central tendency (mean, median, and standard deviation) were provided for the continuous dependent variable (IP). Records containing missing data were eliminated from the study (Pallant, 2013).

Three-way ANOVA was used to test the hypotheses of the study. The focus was on potential differences of IP in IT professionals within specific categories of gender, age, and level of education. A p-value of 0.05 or less signified differences that were significant (Norusis, 2013).

Prior to hypothesis testing, the assumptions necessary for the use of a three-way ANOVA were checked to ensure the proper use of this analysis with the collected data. Assumptions necessary for the use of a three-way ANOVA included (a) independence of observations, (b) normality of the dependent variable, and (c) homogeneity of variance.

Independence of Observations

Independence of observations was assumed. SurveyMonkey Audience included a very large pool of individuals that provided the study sample. It was assumed that participants did not influence each other since there was no way of ensuring any true state of independence between the chosen participants.

Normality of the Dependent Variable

Normality of the dependent variable was tested using examination of the histogram, boxplot, Normal Q-Q plot, and the results of the K-S test of normality. The ANOVA was robust to violations of the normality assumption (Weinberg & Abramowitz, 2000). Therefore, if there was evidence of a violation of the normality assumption, then a comparison of the mean, median, and 5%-trimmed mean was assessed. If a large difference was not detected between these values, then the raw, untransformed data was used for analysis.

Homogeneity of Variance

Homogeneity of variance was tested using Levene's test for equality of variances (Pallant, 2013). Significance of Levene's test implied heterogeneity of variances. If significant results were found using this test, then a more stringent alpha level, of either .025 or .01, depending on the severity of the violation, was used to correct violation to the homogeneity of variances assumption (Tabachnick & Fidell, 2007).

Results from the three-way (2x4x4) ANOVA were used to address all sets of hypotheses. Hypotheses, which included lower order effects, were only tested if the hypotheses associated with the higher order effects involving the same variables did not show significance.

The three-way interactions were investigated first. If significance was found in the three-way interaction, then the levels within the interaction were further investigated. If significance was not found in the three-way interaction, then the three two-way interactions were investigated. For two-way interactions in which significance was found, the levels within the interaction(s) were further investigated. For two-way interactions in which significance was not found, the main effects that were not part of a significant two-way interaction were investigated. For investigated main effects in which significance was found, the relationship between groups were investigated further. For investigated main effects in which significance was not found, investigation ceased.

There was no non-parametric alternative to test the interaction effects of a three-way ANOVA. If a three-way ANOVA could not be used for this study, then a series of three Kruskal-Wallis tests would have been performed to test the main effects of the independent variables (gender, age, and level of education) on the dependent variable (IP).

Validity and Reliability

Validity and reliability of this study was enhanced using a proven instrument. The CIPS has been used in numerous studies since the latest version was developed in 1985 (Bernard, Dollinger & Ramaniah, 2002; Ross, Stewart, Mugge, & Fultz, 2001; Thompson, Davis, & Davidson, 1998).

Validity

The CIPS was validated by Chrisman, Pieper, Clance, Holland, and Glickauf-Hughes (1995), and subsequently compared to the PFS (Kolligian & Sternberg, 1991). As a means of determining construct validity, CIPS and PFS were compared in multiple areas: depression, psychological well-being, self-esteem, and self-monitoring. Overall CIPS and PFS were proven to be highly correlated (r = .78, $p \leq .01$) (Chrisman et al., 1995). Additionally, discriminant validity evidence was reported by Chrisman et al. (1995) through "comparison of the CIPS to measures of depression, self-esteem, self-monitoring, and social anxiety" (p.465). Although each of these scales proved to be related to the CIPS, they were also substantially discriminable from the CIPS (Chrisman et al., 1995).

Reliability

High internal consistency reliability was reported on the CIPS with Cronbach's coefficient alpha values ranging from .84 to .96 (Holmes, Kertay, Adamson, Holland, & Clance, 1993 as cited in Chrisman et al., 1995; Prince, 1989 as cited in Chrisman et al., 1995). Additionally, internal consistency reliability was assessed with the collected sample for the study using Cronbach's coefficient alpha.

STUDY RESULTS

Population and Descriptive Findings

The actual study sample (N = 374) consisted of experienced IT professionals registered as survey participants with SurveyMonkey Audience. Only participants who agreed to answer the demographic questions and all IP scale questions were included in this study. All participants had at least seven years of experience in the IT field. Table 1 presents the frequencies and percentages of the descriptive variables of the study.

Six participants provided responses that were not aligned with the survey categories for level of education. Those six responses were initially included in the *Other* category for Level of education and then placed into results for the corresponding areas listed as follows: two individuals indicated "GED" and "High School/Manufacturer Training" and were combined with "High School," one individual listed "Business School" and was included in "Some College," one individual who indicated "Some Graduate School" was added to "Associate or Bachelor's Degree," and the two who listed specific graduate degrees were included with "Graduate Degree."

No significant three-way interaction was found among gender, age, and level of education, F (5, 352) = 0.16, p = .977. There was no statistically significant two-way interaction effect between gender and age, F (2, 352) = 0.58, p = .559; between gender and level of education, F (3, 352) = 0.09, p = .967; or between age and level of education, F (5, 352) = 1.29, p = .269. There was no significant main effect for gender, F (1, 352) = 0.32, p = .574. Additionally, there was no significant main effect for level of education, F (3, 352) = 0.18, p = .907.

There was a significant main effect for the independent variable of age, F (2, 352) = 9.10, $p < .0005$, indicating significant differences in mean IP scores for the different age groups. Pairwise comparisons on the estimated marginal means of the three age groups via Tukey's HSD test indicated that mean IP scores were significantly higher for participants aged 30-44 (M = 55.26, SD = 2.52) than for participants over 60 (M = 44.73, SD = 1.76).

Table 1: Frequency Counts and Percentages of Descriptive Variables (N=374)

Variable	Frequency	%
Gender		
Male	209	55.9
Female	165	44.1
Age		
18 to 29 years	0	0
30 to 44 years	123	32.9
45 to 60 years	179	47.9
Over 60 years	72	19.3
Level of education		
High school	8	2.1
Some college	64	17.1
Associate's or bachelor's degree	197	52.7
Graduate degree	99	26.5
Other	6	1.6

These findings indicated that participants younger than the age of 60 experience the IP more frequently than participants older than 60. Additionally, pairwise comparisons indicated that mean IP scores were significantly higher for participants aged 45-60 (M = 48.59, SD = 1.55) than for participants over 60.

Findings of the three-way ANOVA between groups model are presented in Table 2, estimated marginal means for the main effects are presented in Table 3, and pairwise comparisons are presented in Table 4. Figure 1 presents a plot of the estimated marginal means on IP scores across the three age groups.

Table 2: Three-way ANOVA Table of Comparison of Means for the Dependent Variable of Impostor Phenomenon Score According to the Independent Variables of Study (N = 374)

Independent Variable	Type III Sum of Squares	*df*	Mean Square	*F*	*p*	*η2*	power
Corrected Model	4770.30	21	227.16	1.39	.120	.077	.917
Gender * Age * Level of Education	130.69	5	26.14	0.16	.977	.002	.087
Gender * Age	190.88	2	95.44	0.58	.559	.003	.147
Gender * Level of Education	43.20	3	14.40	0.09	.967	.001	.066
Age * Level of Education	1,051.64	5	210.33	1.29	.269	.018	.455
Gender	51.67	1	51.67	0.32	.574	.001	.087
Age	2,976.03	2	1,488.01	9.10	<.0005	.049	.975
Level of Education	90.15	3	30.05	0.18	.907	.002	.084
Intercept	217,028.13	1	217,028.13	1,326.71	<.0005	.790	1.000

Note. df = Degrees of Freedom; p = p-value; η^2 = partial eta squared

Table 3: Three-way ANOVA Table of Comparison of Means for the Dependent Variable of Impostor Phenomenon Score According to the Independent Variables of Study (N = 374)

Between Groups Variable	M_{Est}	*SE*	95% Confidence Interval	
			Lower	Upper
Gender				
Male	49.04	1.68	45.74	52.34
Female	50.89	1.65	47.64	54.14
Age				
30 to 44	55.26	2.52	50.31	60.21
45 to 60	48.59	1.55	45.54	51.64
Over 60	44.73	1.76	41.27	48.20
Level of education				
High school	51.13	5.22	40.86	61.39
Some college	50.28	1.89	46.57	53.99
Associate's or Bachelor's degree	49.95	1.00	47.99	51.92
Graduate degree	48.87	1.40	46.12	51.63

Note. M_{Est}= Estimated Marginal Mean; *SE* = Standard Error

Table 4: Pairwise Comparisons for the Independent Variable of Age (N=374)

(I) Age	(J) Age	Mean Difference (I-J)	*SE*	*p*	95% Confidence Interval	
					Lower	Upper
30 to 44	45 to 60	2.50	1.50	.218	-1.02	6.03
	Over 60	7.01	1.90	.001	2.55	11.48
45 to 60	30 to 44	-2.50	1.50	.218	-6.03	1.02
	Over 60	4.51	1.79	.032	0.31	8.71
Over 60	30 to 44	-7.01	1.90	.001	-11.48	-2.55
	45 to 60	-4.51	1.79	.032	-8.71	-0.31

Note. SE = Standard error; *p* = p-value

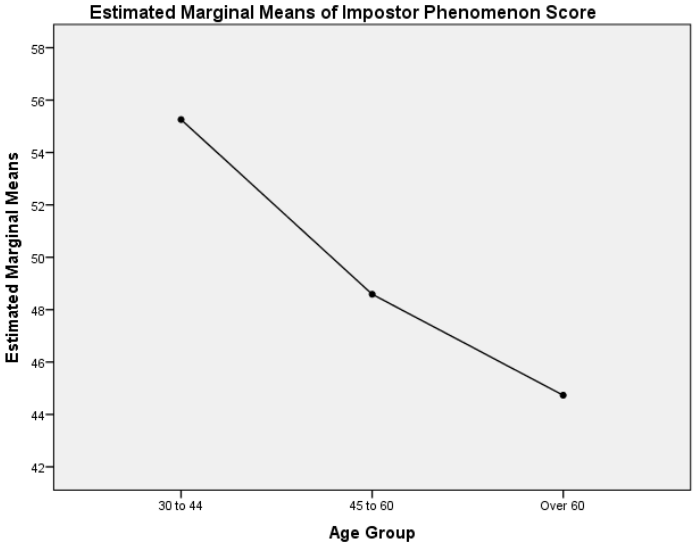

Figure 1: A Plot of the estimated marginal means of IP scores across the three age groups of this study: 30 to 44, 45 to 60, and Older than 60.

The three-way ANOVA between groups was conducted to explore the impact of the independent variable groups of (a) gender, (b) age, and (c) level of education on the dependent variable of IP score. The only significant effect in the model was the main effect of Age, F (2, 352) = 9.10, p < .0005, indicating significant differences in mean IP scores for the different age groups. A review of the pairwise comparisons indicated that participants over 60 had significantly lower mean scores than participants age 30 to 45 and participants age 46 to 60. These results implied that participants under the age of 60 are more frequently and seriously affected by the IP than participants over the age of 60.

CONCLUSIONS AND RECOMMENDATIONS

The only independent variable that provided statistically significant results was age. The categories for age were 30 to 44, 45 to 60 and over 60. Based on the data, as an IT employee becomes older and gains expertise, the employee experiences less episodes of doubt, to include fear of failure. This presents various avenues to investigate to determine why age is such a critical factor in an experienced, educated, and trained IT professional's frequency of Impostor feelings.

Age and Motivation

The first area examined was motivation as it is germane to age. There were only a few examples of empirical studies, which included large sample sizes and closely examined whether age plays a key role in motivation of employees (Kooij, de Lange, Jansen, Kanfer, & Dikkers, 2001). Some research suggested older employees are simply less motivated than younger employees overall (Inceouglu, Segers, & Bartram, 2011). In addition, age was presented as a negative factor with the implication that the older an employee is, the less energy the employee applies to projects, and the less interest the employee exhibits in training opportunities (Noack & Staudinger, 2009). For the most part, as employees mature and experience variations in their stages of life, such as starting a family, their experiences can alter their emotional state and perception of their own self-concept (Inceouglu et al., 2011). This type of experience can force a more detailed look at the individual's long term goals in life (Inceouglu et al., 2011). Many of these life altering experiences result in what Kanfer and Ackerman (2004) considered a shift in motives. This change in motives, and motivation per se, facilitates another change in the weight motive may play in the IT professional's life goals and importance of preferred job features (Warr, 2001).

Age and Self-Esteem

The second area is confidence or self-esteem. This research indicated that as educated and experienced IT employees' age, they become more confident in their ability to do their job, reflected in older employees experiencing fewer Impostor feelings. Their confidence can be related to various things. Another common trend among older adults in this demographic is the trend to pursue self-development, especially those that have received degrees from universities and colleges (Birdi, Allan & Warr, 1997). As a person continues to grow in their level of expertise, the ease with which they complete their assigned duties increases with age allowing these employees to appear to exert little to no effort and still end up with the same results of employees in a younger age range (Kanfer & Ackerman, 2004). The difference lies in the amount of experience an IT employee has that positively correlates to the level of confidence displayed by more experienced employees. In addition, younger employees are still learning their craft and cannot rely on an equivalent level of working knowledge and first-hand experience from past successes.

The employees in the 45 to 60 and over 60 age ranges in this study were able to easily acquire new knowledge that already ties to an existing knowledge base whether it be from education or experience (Inceouglu et al., 2011). The minimal amount of effort needed allows this specific age range of employees to extend its reach over into their personal lives as well influencing the level of importance placed on employment environments (Baltes & Staudinger, 2000). Basically, the participants in the 45 to 60 and Over 60 ranges have ranked the importance of varying degrees of employment while balancing those priorities with their personal life positively influencing their life goals and level of acceptance of who they are in comparison to who they want to be (Fleeson & Heckhausen, 1997). Successfully achieving the desired work life balance further explains the stability of their emotions and lower level of Impostor feelings (Helson & Soto, 2005).

Age and Acceptance

The third area of discussion that may explain the significance in the independent variable of age is acceptance. As employees enter a new working environment they make a choice to either fit into the corporate culture or attempt to change the corporate culture. For the most part, older participants tend to accept the culture and are more prone to pursue and be

readily accepted into routine social interactions. In addition, employees in the 45 to 60 and over 60 age ranges are more prone to exhibit balanced emotions and disassociate themselves from unnecessary conflict (Charles & Carstensen, 2008). This ease of becoming acclimated to new environments, or maintaining the status quo in familiar environments, is directly related to the age and level of confidence of these employees facilitating a positive mental outlook and a lower degree of Impostor feelings. Their focus has moved from personal achievement to more mission and task orientated actions (Maehr & Kleiber, 1981). Younger workers often exert a fair amount of energy into transforming their working environment into what they want it to be, rather than attempting to fit into what it currently is. Information technology employees in the 29 to 44 age range also fail to see the importance of acceptance, which would allow them to gain allies and support. This is often exhibited by a lack of desire to listen to or embrace feedback from more seasoned employees.

Age and Effective Communication

A fourth area of discussion communication. Organizational culture regarding when to communicate can often be misinterpreted due to various types of individual preferences on how to communicate, whether that communication is as an individual or in a group setting. These differences can affect the satisfaction and productivity of a workforce (Jablin & Krone, 1994). A closer look at the specific characteristics of participants in the 30 to 40 age range in comparison to the participants age 41 and over provides a more explicit understanding of the mindset of younger adults in the field of IT.

The level of communication as well as the frequency of communication, within an organization, is a key factor to the success of millennials in work environments within the field of IT. Millennials born between the years of 1974 and 1979 are often victims of a negative stereotype in terms of consistent communication requirements (Inceouglu et al., 2011). This specific group of millennials desires the ability to participate in continuous information flow in all directions and for all reasons. Communication with peers or supervisors can also be deemed the most critical of all information and communication flow. In particular, communication is a determining factor for facilitating, creating, and maintaining relevant working relationships among teams and individuals across an organization (Herriot & Scott-Jackson, 2002).

Communication is most often reciprocated among employees who foster similar beliefs and commitment to the level of productivity within the organization (Greenbaum & Query, 1999). The level of commitment an employee in the 30 to 44 age range makes to an organization or to a specific relationship (i.e., a specific supervisor or a specific department) is a direct indication of that employee's feelings of confidence in his or her own ability, acceptance as an asset to the team among coworkers, as well as a feeling of importance from the employees these individuals interact with the most. Employers must consider the many facets of personalities, motivation, and desire to be accepted and become a successful member of a team as new employees are brought into the work environment.

Recommendations for Employers

Supervisors and hiring officials of experienced IT professionals are encouraged to actively pursue knowledge about the current staff in addition to potential new hires. This study showed IT professionals in the 45 to 60 age range experienced less episodes of the IP than those in the 30 to 44 age range. In addition, IT professionals in the Over 60 age range experienced the least amount of IP episodes among all three groups of participants. Based on the results of this study, the four areas of importance for a successful organization, as it relates to managing IT professionals are motivation, confidence, acceptance and communication.

Employee Motivation

The level of motivation among IT employees differs considerably based on the age of the employee. The attractiveness of perks an organization offers may vary depending on what is important to that specific employee. For example, many millennials are often interested in flexible options such as teleworking or alternative work schedules. Many employees age 45 to Over 60 are not as interested in options that take them outside of the normal structure of entering and leaving an actual organizational facility during the workday. Also, IT employees in the 30 to 44 age range are often interested in diversification efforts within an organization (Howe & Strauss, 2000; Tapscott, 1998; Zemke, Raines & Filipczak, 2000). They embrace changes in technology and are extremely interested in experiencing new things. Having an open mind in terms of diversity and being comfortable with consistent change tend to be positive aspects for younger IT employees. These positive aspects would facilitate some level of confidence despite frequent occurrences of Impostor feelings in IT professionals in the 30 to 44 age range.

Employee Confidence

Confidence is higher among IT professionals in the 45 to 60 age range when compared to those age 30 to 44. The level of confidence of IT professionals Over 60 is

the highest among all experienced IT professionals. The majority of this confidence in employees age 45 to Over 60 is based on their extensive working knowledge. In addition, the ability to manage personal and professional lives successfully is a necessity and boost the level of confidence of many employees in terms of their ability to handle multiple tasks and delegation in the workplace.

Managing Expectations

The second area of consideration for organizations managing IT professionals is navigating the expectations of employees. Providing a venue for orienting employees with an organization can assist the level of acceptance. Implementing collaboration exercises and team building workshops into the orientation process or very early in a new employee's entry into the organization also assists in the acceptance process. These activities provide an opportunity for 30 to 44-year-old IT professionals to spend a considerable amount of time with more seasoned employees so they can gain an appreciation for how the organization currently works. Having this level of historical knowledge soon into the experience of entering the organization may facilitate a better understanding of the mindset of employees in the 45 to 60 and Over 60 age ranges maximizing employee collaboration.

Effective Communication Strategies

Another consideration is communication. Often, it might be necessary to personalize the frequency of communication and type of communication used during interactions with each individual employee. While this may feel overwhelming to some leaders, it could be a welcomed relief to those that prefer open communication. Identifying and implementing effective communication strategies can facilitate a much needed bridge to bond younger employees in the age range of 30 to 44 with their older more seasoned coworkers and supervisors in the 45 to 60 and Over 60 age ranges.

SUMMARY

This study determined whether the IP is generally prevalent or more prevalent within specific categories of demographics such as gender, age, and level of education among IT professionals. In addition, another goal of this research was to evaluate alternative reasons for the perception that men and women are not of equal level of experience or expertise in the fields of IT and Organization and Management as it applies to managing an IT workforce. Administering this survey among seasoned, educated, and trained IT professionals proved that among actual IT professionals there is not a concern based upon the gender or level of education of the individual, but there is a grave distinction among IT professionals' frequencies of Impostor feelings based on their age.

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