Impostor Phenomenon in Software Engineers

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Abstract. *The Impostor Phenomenon (IP) is the feeling of inaccurately perceiving oneself and frequently facing a significant fear of being exposed as a fraud, with impacts that can lead to mental disorders such as depression and burnout. This dissertation describes research that investigates the extent of impostor feelings among software engineers, considering aspects such as gender, race/ethnicity, and professional roles. Additionally, we explore the influence of IP on perceived productivity. Our results indicate that 52.7% of software engineers experience frequent to intense levels of IP, which has a statistically significant negative effect on perceived productivity.*

Resumo. *O Fenômeno do Impostor (FI) é a sensação de não se reconhecer com precisão e frequentemente enfrentar um grande medo de ser descoberto como uma fraude, e os seus impactos possam levar a transtornos mentais, como depressão e burnout. Esta dissertação descreve uma pesquisa que investiga a extensão dos sentimentos de impostor em engenheiros/as de software, considerando aspectos como gênero, raça/etnia e papeis profissionais. Além disso, investigamos a influência do FI na produtividade percebida. Nossos resultados indicam que uma proporção de 52,7% dos engenheiros de software sofrem de níveis frequentes a intensos do FI e isso tem um efeito negativo estatisticamente significativo na produtividade percebida.*

1. Background and Motivation

The Impostor Phenomenon (IP) is a psychological phenomenon that affects high-achieving individuals, causing them to doubt their accomplishments and fear being exposed as frauds [Clance 1985]. Individuals suffering from this phenomenon find themselves trapped in a cycle that is very difficult to break. Based on the current literature, we know that impostor feelings are shared among Computer Science students [Rosenstein et al. 2020]. A consistent finding across these studies is that more than half of the students experience IP. However, despite the findings of these studies, there was no scientific confirmation that impostor feelings persist into the professional lives of individuals with a degree in Computer Science. This study fills this gap by showing the prevalence of IP among software engineers and its relationship with perceived productivity.

2. Methodology

We designed a theory-driven survey based on validated scales. The presence and extent of the phenomenon can be assessed using the Clance Impostor Phenomenon Scale (CIPS), a widely utilized and reliable 20-question instrument. To evaluate perceived productivity, we developed 10 questions based on the SPACE framework, which encompasses five dimensions of productivity: Satisfaction, Performance, Activity, Communication and Collaboration, and Efficiency and Flow. The survey received 624 complete answers from software engineering professionals.

To assess the representativeness of our sample, we compared its characteristics with data from Stack Overflow's annual software developer survey. To evaluate the manifestation of the IP among software engineers, we used the Bootstrapping technique, which is considered more reliable and precise than direct statistical inferences. By re-sampling our dataset 1,000 times, we created simulated samples to enhance the robustness of our analysis, calculating confidence intervals and frequencies for various demographic factors. We developed Python scripts for these analyses, with the CIPS scale providing scores for IP intensity and a Boolean indicator for meeting the IP criterion. Finally, we applied the nonparametric Mann-Whitney U-test to determine statistically significant differences (alpha value 0.05) between IP presence and perceived productivity.

3. Results and Concluding Remarks

The results of this study were published and presented at ICSE-SEIS 2024 [Guenes et al. 2024]. Our key findings reveal that 52.72% of software engineers experience frequent to intense levels of IP. Notably, underrepresented groups show alarming disparities: women are significantly more affected (60.64%) compared to men (48.82%), and Asian (67.85%) and Black (65.11%) engineers experience higher rates of IP than their White counterparts (50.00%). It is noteworthy that, in the case of underrepresented groups, the work environment may contribute to or exacerbate these symptoms, particularly for these groups. Additionally, IP is less prevalent among individuals who are married and have children. A consistent pattern emerged from the investigation of the perceived productivity, indicating lower perceived productivity across all five assessed productivity dimensions of the SPACE developer productivity framework for software engineers suffering from IP. These differences were statistically significant. These findings provide evidence confirming the hypothesized notion that IP can be a significant barrier to professional productivity in software engineering.

Referências

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