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Article

Impression Management by Information Technology Professionals When Reporting Flow at Work: A Study at the Individual and Team Levels of Occupational Culture

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Abstract: Information technology (IT) professionals have been depicted as good examples of in-flow individuals and teams. Accordingly, their workplace is acknowledged as ludic and relaxed, while also immersive and productive. The present study discusses evidence of actions effected by IT professionals to institutionalize and reinforce this mostly positive image when they report perceptions about themselves, their cohorts, and their routines at work. The study involves the processing of two datasets of responses given by IT professionals to questionnaires on the state of flow at work concurrently with other phenomena of positive psychology at both the individual and team levels. The datasets included contrasting (positive and negative) attitudinal measures that enabled a statistical discussion on whether IT professionals overestimate the positive aspects of their profession. This study concludes that cognitive dissonance and practices of impression management are likely involved in how IT professionals address flow-related questions to reinforce a positive image at work. Recommendations for scholars and industry researchers involve better questionnaire-crafting techniques to minimize measurement and inference biases, as well as contrasting self-reports with actual behaviors to build stronger indicators of the work climate, the routines, and the mood of IT personnel.



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Keywords: information technology culture; impression management; cognitive dissonance; flow; answering bias; psychometric research

1. Introduction

Information technology (IT) professionals have been depicted as good examples of in-flow individuals and teams (Jácome de Moura & Porto-Bellini, 2019a). Accordingly, their workplace is acknowledged as ludic and relaxed while also immersive and productive, given that the workplace significantly reflects the characteristics of the individuals therein (Porto-Bellini et al., 2022). However, it is a myth that all IT professionals are “fun lovers” (Crane et al., 2022) or experience flow at work (Ritoni et al., 2022). The same applies to other characteristics largely considered homogeneous in an otherwise globally heterogeneous workforce, as recently revealed by the World IT Project (Palvia et al., 2023b; Jacks et al., 2022; Palvia et al., 2021). Stereotypes in fact exist about the IT occupation, most of them conveying a positive image of the professionals and their routines. Besides possessing unique technical competencies, they have been depicted as exhibiting desirable soft characteristics like resilience, assertiveness, optimism, teamwork, work drive,

vision, and satisfaction with the job and with the career (Jácome de Moura & Porto-Bellini, 2019a; Cui, 2017; Lounsbury et al., 2007). Studies have also found that IT professionals manifest motivation to face challenges (Jacks & Palvia, 2014), concentration on the task (Candatten et al., 2013), and enjoyment in coding/programming (Pratt et al., 2016) to the extent of losing track of time (Jácome de Moura & Porto-Bellini, 2019a), which is a characteristic of autotelic experiences according to flow theory (Csikszentmihalyi, 1990).

One partial explanation for the highly positive image of IT professionals regarding their soft skills is that the measurement of performance at work has changed from assessments of extant knowledge and skills to a more longitudinal evaluation of what a professional effectively does and is able to master (Sennett, 2006). The need to hire people who can adapt and learn quickly puts IT professionals at the vanguard of such changes in the work environment (Marjanovic & Murthy, 2022). In fact, since the IT workforce is challenged by both the “rapid emergence of new technologies” and the “pressure to generate quick results” (Porto-Bellini et al., 2019, p. 1473), their mere technical skills are not sufficient for career success, and as such, soft skills related to managerial knowledge, social interactions, and group dynamics add to an already impressive portfolio of competencies of the IT professional (Marjanovic & Murthy, 2022; Joseph et al., 2010; Bassellier & Benbasat, 2004).

However, another partial explanation for the positive image of the IT workforce refers to the possible influence of impression management (Goffman, 1978). IT professionals may realize that certain expectations from others have a role in career prospects and in personal well-being, that, in turn, makes them forge a positive image of themselves to others. This may happen by resorting “to impress researchers with positive accounts” of their activities (Pawlowski & Robey, 2004, p. 665), advocating a stereotypical image of talented workers who must be well rewarded (Eckhardt et al., 2014) and communicating status signals in order to boost employability (Tifferet & Vilnai-Yavetz, 2018). Indeed, a recent survey with IT students revealed that they adjust desirable answers in personality assessments towards better employment opportunities by adhering to expectations in the profession (Tomat et al., 2022).

The highly positive image of the IT workforce in the scholarly literature thus makes one wonder if IT professionals forge their social image when providing answers to self-reported, perception-based psychometric instruments aimed at measuring aspects of their professional occupation. The present study focuses on those instruments because they are typically used to collect workers’ attitudinal data. Our assumption is that, beyond the actual competencies of the IT professionals, practices of impression management (Goffman, 1978), along with answering biases such as social desirability (Fisher, 1993) and acquiescence (Watson, 1992), help institutionalize the image of that workforce. A related issue is cognitive dissonance (Festinger, 1964), whereby respondents may anticipate answers to a questionnaire so as to increase cognitive harmony. More specifically, the present study is interested in how IT professionals provide answers to psychometric surveys about the state of flow at work, which has been reported as a characteristic of IT people (Licorish & MacDonell, 2017). Flow is a mental and behavioral state conveying many phenomena of positive psychology, thus granting researchers access to numerous characteristics of IT professionals. Indeed, a review of three decades of flow research shows that flow at work conveys absorption, creativity, engagement, curiosity, enjoyment, and many others positive phenomena (Jácome de Moura & Porto-Bellini, 2019b). Therefore, the research question in this study is: Do IT professionals possibly manage the impression of others in regard to being in flow at work? The present study answers this question by drawing on theories of impression management, cognitive dissonance, flow, and questionnaire-filling behaviors, and by deploying statistical tests on two datasets with contrasting (positive and negative) measures on the occurrence of flow during IT work both at the individual

and team levels. The study additionally discusses whether the items in a psychometric questionnaire set the boundaries of possible responses for IT professionals about their perceptions of flow. Therefore, if properly phrased, questionnaires may help forge the impression that an autotelic experience is a natural and frequent phenomenon in IT work. Three agents contribute either consciously or not to institutionalize that impression: (1) the researchers who craft the questionnaires and analyze the data, (2) the IT professionals who answer the questionnaires, and (3) the audience that consumes and accepts the research findings. The present study finally contributes to calls for research on the mental models of IT professionals (e.g., [Balijepally et al., 2015](#)), in particular, [Ritonummi et al.'s \(2022\)](#) thoughts on those professionals' autotelic characteristics and their effective opportunities to be in flow or not.

The article is organized as follows: First, it presents the theoretical framing of impression management and the experience of flow as a resource to mitigate cognitive dissonance. Second, it shows a summary of the IT professional occupation, demonstrating that it is generally seen from a mostly positive perspective, from which three hypotheses are developed. Third, the article presents the datasets used to contrast positive measures of flow with other positive measures (of a construct called “vibration”) as well as with negative measures (of a construct called “boredom”) in order to statistically derive an answer to the research question. Fourth, the results of the study are provided along with implications for theory and practice, limitations, and future studies. And last, the article includes conclusions about IT professionals managing an image that corresponds to their conscious or unconscious desires and social expectations.

2. Literature Review

2.1. Impression Management and Cognitive Dissonance

The theory of *impression management* explains how individuals consciously seek to present themselves in a way that satisfies their goals. It is grounded on the concepts of *face* and *face-saving*, i.e., “a universal form of social interaction among individuals concerning how we present ourselves to others and how we evaluate ourselves” ([Keil et al., 2007](#), p. 63), which explains social phenomena like politeness, compliance, impression, negotiation, and conflict. According to [Goffman \(1978, p. 1\)](#), such phenomena occur in any social setting where “a team of performers [...] cooperate to present to an audience a given definition of the situation”. The social setting has a *hidden space* to prepare the performance, and a *front space* to show the performance to an audience, with the team of performers sharing familiarity, solidarity, secrets, and tacit agreements on the roles of the performers and the audience. Information asymmetry is an important assumption, as the audience should not have access to certain information restricted to the performers ([Whittington et al., 2016](#)). Disruptions in information asymmetry may occur through unintentional gestures or gaffe, thus discrediting or contradicting the performance, whereas tacit agreements among the participants help, “saving the show” ([Goffman, 1978, p. 1](#)).

Relatedly, when an individual interacts with others, he or she projects, consciously or not, an intended image ([Bolino et al., 2016](#); [Aronson & Aronson, 2007](#); [Leary & Kowalski, 1990](#)). A disruption may convey threats to such a fostered impression at three levels: (1) the social interaction becomes undefined, unpredictable, and disorganized, (2) the performer's ability to perform as well as his or her reputation become weaker, and (3) his or her self-conception (personality and ego) becomes discredited ([Goffman, 1978](#)). Since people tend to make strong associations between themselves and their projected image ([Ricard & Singer, 2017](#)), they will struggle to keep coherence and avoid disruptions between performance and expectations. Expectations emerge once “impressions that the others give tend to be treated as claims and promises they have implicitly made, and claims and promises

tend to have a moral character” (Goffman, 1978, p. 7). Therefore, the individual seeks to convey a moral commitment both with him/herself and others, “engineering a convincing impression that these standards are being realized” (Goffman, 1978, p. 8).

Disruptions during a performance may lead to conflicts between the cognitive structures and situations the individual has experienced. In this case, one should resort to mitigation actions to interrupt the discomfort that manifests as depressive or aggressive attitudes or as conflicts characterized by *cognitive dissonance* (Festinger, 1964). Conscious or unconscious dissonance pushes the individual to seek solutions by means of mental trickery, attitudinal changes, and even by distorting reality. The attenuation of cognitive dissonance follows one of several strategies (Harmon-Jones, 2012): (1) the *action-based strategy* is an option when inconsistent cognitions do not fully form cognitive dissonance and would not influence behavior, thus being simply ignored by the individual; (2) the *overvaluation of results* or *effort justification strategy* is an option when the individual wants to exaggerate a positive rationalization to justify an unpleasant effortful action; (3) the *induced-compliance strategy* is an option when it is necessary to change beliefs; (4) the *self-affirmation strategy* is an option when dissonance is interpreted as a threat to self-image and the individual then changes the relative importance of the involved cognitions; (5) the *self-consistency strategy* is an option when the individual performs a behavior that is inconsistent with the self-concepts and then decides to change the most resistant attitudes; and (6) the *spreading of alternatives strategy* is an option when individuals have seemingly equal alternative decisions to make and opt for a decision that eventually manifests as the best one.

2.2. Flow

Except for the action-based strategy, which simply ignores dissonance, the other strategies involve resorting to changes and adaptations, including in one’s beliefs. The beliefs of IT professionals in their own willingness to face challenges (Licorish & MacDonell, 2017), in their ability to generate organizational results based on high levels of self-efficacy (Schaufeli et al., 2008), and in their ability to learn and master new technologies (Pratt et al., 2016) characterize a self-image well described by cognitive absorption (Agarwal & Karahanna, 2000) according to the theory of *flow* (Csikszentmihalyi, 1990). Flow theory conceives the *state of flow* as depending on the balance between the environmental opportunities for action (the *challenge*) and the personal resources to deal with it (the *skills*), with such a balance being constantly challenged by the increasing complexity of the task (Csikszentmihalyi & Massimini, 1985). Therefore, this theory seeks to explain one’s intrinsic motivation to engage in constantly challenging activities—what is difficult to do without self-rewarding or autotelic processes. The explanatory power of flow has led researchers to investigate not only its properties, but also the factors that promote its occurrence and outcomes. Accordingly, flow antecedents and consequents have attracted attention in the IT field (e.g., Jacome de Moura & Porto-Bellini, 2019a; Licorish & MacDonell, 2017).

In work activities, individuals who achieve the state of flow are expected to be more efficient than those who do not (Csikszentmihalyi, 1990; Demerouti, 2006). In fact, outstanding performance is attributed to the experience of flow itself, which stimulates the search for better outcomes and satisfaction, that feeds back the process again (Engeser & Rheinberg, 2008). Moreover, the occurrence of flow at work seems to influence an individual’s well-being *out* of work too, especially when one considers levels of “energy” and exhaustion (Demerouti et al., 2012, p. 289; Schippers & Hogenes, 2011). But flow also introduces complexity to measurement as it relates to potentially defensive mechanisms triggered consciously or not by an individual to deal with conflicts. Defense mechanisms usually manifest through altruism, suppression, humor, anticipation, and sublimation (Vaillant, 2000). In the IT field, Joseph et al. (2011) associated flow with playfulness to

investigate the intention of IT professionals to turn over (move to another organization) or turn away (abandon the profession). They found a positive correlation between continuous learning (as a work obligation) and turnover intentions, and a negative correlation between continuous learning (as a play option) and turnaway intentions. Such findings are particularly of note as turnover and turnaway in IT constitute important organizational issues (P. C. B. Lee, 2000; Korsakienė et al., 2015; Joia & De Assis, 2019; Porto-Bellini et al., 2019; Kappelman et al., 2020).

Studies addressing cognitive dissonance and flow show that there is an effort of aligning attitudes (reduced expectations for success and job satisfaction) with the reality of rehearsals and performance, such as the attenuation of dissonance among musicians of an orchestra (Mogelof & Rohrer, 2005). It is also possible to illustrate dissonance attenuation when one manifests preference for an arbitrary assignment of resources even if under comparative disadvantage as per resource assignment to other individuals rather than free competition for resource allocation at work (Hsee et al., 2012). Therefore, it is reasonable to conceive the attenuation of cognitive dissonance as a viable defense mechanism triggered by cognitive incompatibilities to restore the management of impressions. In this sense, flow may emerge as the unconscious outcome of dissonance attenuation to justify an individual in a context. Figure 1 shows the proposed relationship between the three concepts in a process model. Impression management is assumed to exist per se in the IT profession—much like in any other profession—thus constituting the first element in the chain of events. Such an assumption has its roots in corporatism, which manifests when people share interests—including in a profession—and defend those interests as part of an ideological body of beliefs and norms (Wiarda, 1996; Chalmers, 1997). Occasional threats to a worker's image then cause disruption and trigger cognitive dissonance, for which a strategic opportunity for attenuation occurs when a professional answers flow-related items in a questionnaire, i.e., when professionals have the opportunity to restore the positive image of themselves, their cohorts, and their work routines.

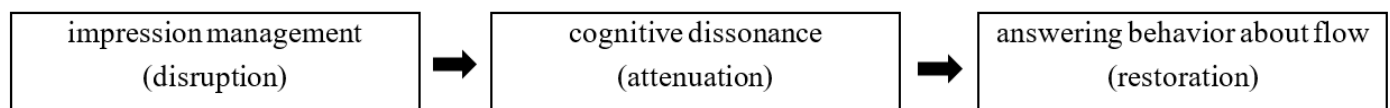


Figure 1. Process model. Note: This figure represents the unconscious or deliberate manipulation of others' impressions once the IT professional realizes that flow characteristics are socially appreciated.

3. Information Technology Profession

The IT profession is home to millions of individuals (Statista, 2022) who have always been in high demand in organizations worldwide (Porto-Bellini et al., 2019). Those individuals share certain globally homogeneous characteristics while also presenting regional nuances, in a unique occupational culture (Jacks et al., 2022; Cranefield et al., 2022; Palvia et al., 2023a; Joseph et al., 2010). They enjoy a positive reputation (Pratt et al., 2016) due to factors such as their permanently evolving complexity and range of knowledge, skills and abilities (Niederman et al., 2016), the high dependency of organizations on IT tools (Liu et al., 2018), and the fact that IT professionals score higher than other business workers in the ASPIRE “positive” values of occupational culture, i.e., autonomy in decision making, structure in the work environment, precision in communication, innovation in technology, reverence for technical knowledge, and enjoyment at work (Jacks et al., 2018). Such values have been reaffirmed in a study carried out from 2015 to 2017 with over 10,000 IT professionals in 37 countries (Jacks et al., 2022) known as The World IT Project (Palvia et al., 2020). Furthermore, IT professionals are seen as disposed to “having fun” during their labor activities (Cranefield et al., 2022), performing innovative work behaviors

(Van Zyl et al., 2021), adapting their beliefs (Harmon-Jones, 2012), being motivated to face challenges (Jacks & Palvia, 2014), concentrating on the task (Candatten et al., 2013), enjoying the task of coding/programming (Pratt et al., 2016) and engaging in effortful thinking (Russo et al., 2022) to the extent of experiencing flow both individually and in teams (Jácome de Moura & Porto-Bellini, 2019a).

However, the IT profession may also be strenuous (Ghosh et al., 2022). The significant numbers who turn over or turn away in the profession (Joseph et al., 2015) illustrate the intention of workers to make career transitions possibly due to exhaustion (Zaza et al., 2022) and especially in times of economic crises (Porto-Bellini et al., 2019). Those numbers also illustrate the challenges faced by employers to retain what is now framed as a liquid workforce (Marjanovic & Murthy, 2022). Moreover, knowing that job satisfaction of IT professionals is negatively correlated with technostress (Kumar et al., 2013) and assuming that the levels of technostress in the IT profession tend to increase due to (1) new business demands and new technologies (Zaza et al., 2022), (2) professional shortage (Joia & Mangia, 2017), and (3) the demand for IT professionals being higher than in other occupations (U.S. Bureau of Labor Statistics, 2022), it is reasonable to assume an increase in dissatisfaction by IT professionals with their jobs. Indeed, a recent study (Young et al., 2023) on the satisfaction of IT professionals with their occupation (i.e., including their jobs) found that IT occupational satisfaction challenges researchers due to expectations that are not confirmed; and another recent study (Langer & Jain, 2024) found that IT professionals tend not to recommend their jobs to those seeking career counseling. It seems that IT occupational satisfaction is impacted by task variety, task autonomy and task feedback, but task significance, task identity and work-life balance do not have an impact (Young et al., 2023). Curiously, though, even if some IT professionals are not satisfied, task procrastination is not a reported phenomenon in the field (Porto-Bellini et al., 2022) and this fact contributes to a positive image of the profession. As a result, even before the IT boom during the COVID-19 pandemic, IT salaries had been steadily increasing at an annual rate of 3.5% as of 2016, 4.2% as of 2017, and 4.4% as of 2018 (Kappelman et al., 2017, 2018, 2019), and employers offered additional benefits as retention strategies, like training (Joseph et al., 2015), participation in task design (Niederman & Sumner, 2004), more flexible work schedules, and medical benefits (Whitaker et al., 2019).

A particularly idiosyncratic aspect of IT work that relates to one's satisfaction is the many ways in which IT work is associated with enjoyment/fun. The mentioned World IT Project verified the presence of enjoyment at the workplace ("level to which members of the IT occupation believe that work should have certain play-like aspects like fun, creativity, and challenge", Jacks et al., 2022, p. 98) among the six ASPIRE critical values of IT professionals (Jacks et al., 2022). Also in that project, the levels of enjoyment in the workplace reported by IT professionals were the reason to cluster together five countries (Germany, India, New Zealand, Nigeria, and UK) considered "creative" (Jacks et al., 2022). Similarly, in another industry study, researchers found "a quantitative link between developer happiness and productivity" and that "the biggest way to increase developer happiness is simply to let them focus on coding" (Upright, 2023)—with happiness being defined as "the feelings of satisfaction, contentment, or joy that people have about their work [and] the sense of well-being [...] based on the quality of their professional relationships, work environment, tools, and processes" (Zenhub, 2022, brackets added). Such associations of enjoyment/fun/happiness with the IT professional occupation are coherent with the high levels of flow reported by the IT workforce (Licorish & MacDonell, 2017) and with fun and flow being considered closely related (Kucuk, 2022; Ritonummi et al., 2022).

In summary, there is an apparently tacit conflict inherent to the IT profession: on the one hand, it is strenuous and it may incur dissatisfaction with the job as well as the intention

of workers to make a profession/career transition; but on the other hand, it is highly valued by employers and recognized by the very professionals under an aura of fun. According to cognitive dissonance theory, when in a controversial/conflicting situation, the individual chooses an attenuation strategy. Until that moment, the individual may experience some manifestations of flow, such as involvement, immersion, and an altered perception of time—even if not being in full flow. In fact, partial states of flow have been reported among IT people (Guo & Poole, 2009; Kao & Chiang, 2015) and numerous impediments to achieve full flow in IT work have recently been identified (Ritonummi et al., 2022). Therefore, after experiencing some aspects of flow but not being in full flow, if an individual answers a questionnaire that explicitly mentions partial flow situations, he or she will possibly identify him/herself with flow as implied in both the acquiescence bias (the tendency to agree with statements in an agreement scale, thus making “positive” questionnaire items reveal positive characteristics of the respondent—Watson, 1992) and the social desirability bias (the “systematic error in self-report measures resulting from the desire of respondents to avoid embarrassment and project a favorable image to others”—Fisher, 1993, p. 303). Indeed, item phrasing in questionnaires has an influence on the correlation of constructs (Schaufeli et al., 2008); thus, treatments are needed to reduce method and measurement bias that results from intentional or nonintentional manipulations (Fisher, 1993; Richardson et al., 2009; Bowling et al., 2021). In such cases, a respondent may falsely manifest positive work phenomena. Two recent studies provide evidence for such possibilities: one study affirms that flow is a characteristic of IT professionals (Licorish & MacDonell, 2017), while another study reports empirical data on boredom (which is located outside the competency zone of flow—Csikszentmihalyi, 1990) being present in IT work (Jácome de Moura & Rosas, 2021).

In conclusion, possibly to deal with higher expectations by others and the self, particularly regarding one’s soft characteristics (Lounsbury et al., 2007), IT professionals seek to manage a certain impression about themselves on others. A recent survey with IT students indeed revealed that they are able to adjust desirable answers in personality assessments towards better employment opportunities by adhering to expectations in the profession (Tomat et al., 2022). In such situations of impression management, if a disruption occurs due to a confrontation between an individual’s positive self-image and a negative description of that image, the induced-compliance strategy (Harmon-Jones, 2012) is the likely choice. That strategy promotes changes in one’s beliefs and motivates the individual to assign low scores to negative flow-related items in questionnaires. This leads to the following hypothesis:

H1. *Negatively phrased flow-related items in a questionnaire have a negative influence on the flow scores assigned by IT professionals as reflecting their work reality.*

In other situations, once a disruption occurs due to a confrontation between an individual’s positive self-image and confirmatory feedback exceeding the positive expectations (like the recognition, by the worker, of an outstanding performance), the effort-justification strategy (Harmon-Jones, 2012) promotes an exacerbation of expected benefits and motivates the individual to assign high scores to positive/reinforcing flow-related items in questionnaires. This leads to the following hypothesis:

H2. *Positively phrased flow-related items in a questionnaire have a positive influence on the flow scores assigned by IT professionals as reflecting their work reality.*

Finally, a third hypothesis tests how independent H1 and H2 are:

H3. *IT professionals’ responses to negatively phrased flow-related items in a questionnaire are (significantly) distinct from their responses given to positively phrased flow-related items.*

Figure 2 summarizes the idea that IT professionals may manage the impression of others about being in flow at work. The underlying assumption is that, beyond the actual competencies of the IT professionals, practices of impression management along with answering biases help forge a socially espoused image of that workforce.

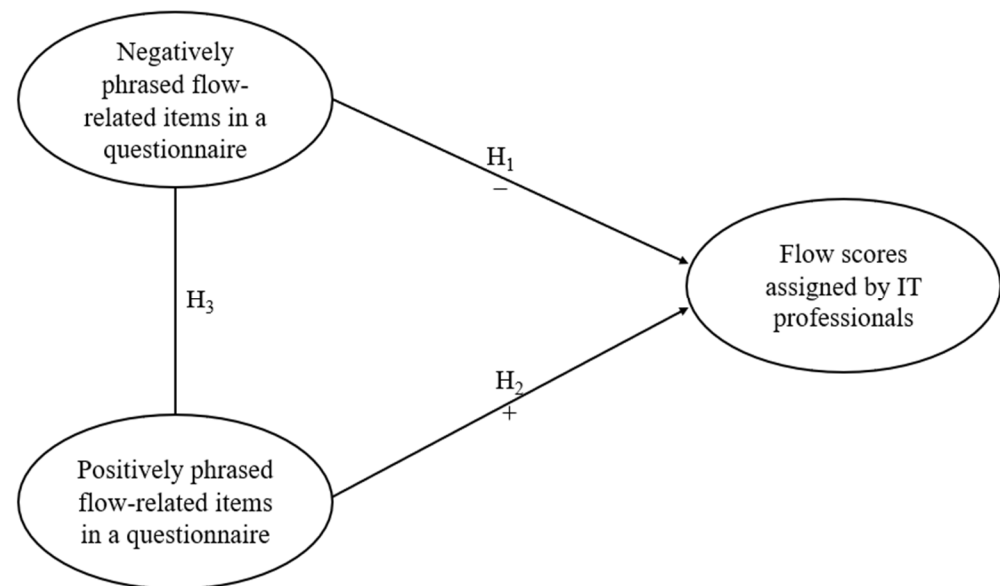


Figure 2. Research model.

4. Method

This study used two available datasets of flow measures built from two samples of IT professionals at the individual and team levels. The datasets were built with data collected with the following instruments: Short Flow Scale (Martin & Jackson, 2008), Job Boredom Scale (T. W. Lee, 1986), Boredom Proneness Scale (Farmer & Sundberg, 1986), and Team Vibration Scale (Jácome de Moura & Porto-Bellini, 2019a). All measures were collected just before the COVID-19 pandemic. The reason to use them now for the purposes of this study is due to insights motivated by a post-pandemic study by Tomat et al. (2022), which seems to be the first to challenge certain socially espoused characteristics of the IT professionals.

Dataset A consisted of 175 observations from a survey measuring the antagonistic mental states of *flow* (a positive phenomenon) and *boredom* (a negative phenomenon). Flow was measured with the nine-item Short Flow Scale. Boredom, in its turn, is a negative mental state associated with sadness or lack of interest due to laziness or excessively repetitive tasks (Csikszentmihalyi, 1990). It was measured with the 15-item Job Boredom Scale and four additional items from the Boredom Proneness Scale. The items on flow and boredom were randomly positioned in the instrument, following recommendations by Loiacono and Wilson (2020). Respondents were mostly men ($n = 148$, 84.6%), but women were well represented ($n = 27$, 15.4%) according to known demographics of the IT profession (Joia & Mangia, 2017). A total of 86 (49.1%) respondents worked in private companies, 78 (44.5%) worked in the public sector, and 11 (6.3%) did not inform their organization's sector. The respondents' average age was 36.6 years ($SD = 12.4$), with 13.7 years ($SD = 9.9$) average experience in the IT field.

Dataset B consisted of 160 observations from a survey measuring the positive phenomena of *flow* and *vibration*. Flow was again measured with the Short Flow Scale. Vibration, in its turn, is a positive state of a team of individuals that collectively experience flow (*shared flow*) and was measured with the 34-item Team Vibration Scale (Jácome de Moura & Porto-Bellini, 2019a). Respondents were mostly men ($n = 130$, 81.3%), but women were again well represented ($n = 30$, 18.8%). A total of 86 (53.8%) respondents worked in private companies,

64 (40%) worked in the public sector, and 10 (6.3%) did not state their organization's sector. The respondents' average age was 31.7 years (SD = 7.9), with 9.3 years (SD = 7.4) average experience in the IT field. The average size of their teams was 9.1 members (SD = 7.5), with a minimum of two and a maximum of 40.

Pre-processing of the data was performed with R programming using *psych* and *rms*, and with Python v3.12.4 using *scipy* and *mord*. For H1 and H2, factorial and regression analyses were performed to address internal validity as well as the influence of variables on flow scores. For H3, *t*-tests were performed to address the responses of the two independent groups. For the reflective constructs, the reliability of scales is traditionally obtained through the joint variation of the latent variable and its observable items (DeVellis, 2003). Even though their factorial structures have been previously validated, assuming validity due to previous validations is questionable (Cronbach & Meehl, 1955), thus validation was performed again for the specific purposes of the present study. Indeed, psychometric instruments require specific validation as validity depends on the items, the context, and the people involved in each study (Larson & Csikszentmihalyi, 1983).

5. Results

Two exploratory factor analyses conducted on datasets A and B showed good factorability (Bartlett's test, $\chi^2(\text{dataset A}) = 1758.79$; $\chi^2(\text{dataset B}) = 4264.29$; $p\text{-value} < 0.000$) and sampling adequacy ($KMO(\text{dataset A}) = 0.82$; $KMO(\text{dataset B}) = 0.90$) (Bartlett, 1937; Penrose, 1955). As for internal validity, all scales presented good reliability ($\alpha \geq 0.7$; Hair et al., 2006). The Short Flow Scale was reliable both in dataset A ($\alpha = 0.70$) and dataset B ($\alpha = 0.81$). The Boredom Scale was also reliable ($\alpha = 0.89$) as well as the Team Vibration Scale ($\alpha = 0.95$). Common method variance was addressed using Harman's single-factor test (Podsakoff & Organ, 1986) in each analysis. This approach is acceptable when the number of latent factors is not too large (Malhotra et al., 2006), as in the present cases of flow and boredom as well as flow and vibration.

In dataset A, seven factors had eigenvalues above 1 and explained 53.7% of the variance in the data. Since the first factor accounted for less than 50% of the variance (22.1%), the results are unlikely to have been affected by common method bias. The same was performed for dataset B, resulting in nine factors with eigenvalues above 1 and 57% of explanation of data variance. Its first factor also accounted for less than 50% of the variance (14.2%). As for normality, skewness and kurtosis, the Shapiro and Wilk's (1965) test suggests sampling inadequacy of both datasets ($W(\text{dataset A}) = 0.44$; $W(\text{dataset B}) = 0.2$; $p\text{-value} < 0.000$) and failure to meet the assumptions for normal linear regressions. Therefore, we opted for binomial logistic models, which do not require such premises (Peng et al., 2010). The binary dependent variable was defined based on the flow score of each respondent, assuming the mean of average scores as a threshold (a flow score higher than the mean of the average scores suggests the occurrence of flow and, therefore, takes value "1"; the other cases take value "0"). Table 1 describes the logistic regression results.

Table 1. Logistic regression results.

Measures	Items (Qty.)	N	Nagelkerke R ²	Pseudo R ²	Log-Likelihood
Flow and Boredom	28	175	0.35	0.22	−94.542
Flow and Vibration	41	160	0.49	0.37	−51.075

Note: Items show the number of items in each questionnaire (flow and boredom, and flow and vibration). Nagelkerke R² varies between 0 and 1 and measures the proportion of total variation in the dependent variable (flow) that can be explained by independent variables (boredom and vibration) in the model. Pseudo R² varies between 0 and 1 and provides an indication of model fit. The log-likelihood value varies from negative infinity to positive infinity and is useful for comparing two or more models, being the model with the highest log-likelihood value that best fits the data.

Regression analyses assume the independent variables to be highly correlated with the dependent variable, but with low intercorrelation (low multicollinearity). When multicollinearity occurs, the standard error increases, and it becomes more difficult to estimate the dependent variable. According to O'Brien (2007, p. 687), the variance inflation factor (VIF) and its inverse, the tolerance factor, define a “measure of collinearity for the centered values of the independent variables”, and both coefficients are grounded on the R^2_i , which represents the variance of the i th independent variable around its mean that is explained by the other independent variables in the model. That is, VIF informs a measure of how much the variance (R^2_i) increased by the lack of independence between variables in a model. As a rule of thumb for multicollinearity evaluation, tolerance of less than 0.1 and VIF higher than 10 (or tolerance of less than 0.2 and VIF higher than 5) indicate a potential multicollinearity problem (Hair et al., 2006). As Table 2 shows, items V10 (VIF = 5.59; Tolerance = 0.18) and V35 (VIF = 5.13; Tolerance = 0.19) required attention.

Table 2. Multicollinearity analysis for Vibration.

Item	VIF	ISE	Tolerance
V01	3.86	1.97	0.26
V03	2.83	1.68	0.35
V04	1.79	1.34	0.56
V06	3.12	1.77	0.32
V08	3.19	1.79	0.31
V09	2.85	1.69	0.35
V10	5.59	2.36	0.18
V11	2.67	1.63	0.37
V12	4.01	2.00	0.25
V13	4.08	2.02	0.24
V15	3.16	1.78	0.32
V16	2.21	1.49	0.45
V19	3.07	1.75	0.33
V21	2.16	1.47	0.46
V22	3.42	1.85	0.29
V24	4.39	2.10	0.23
V25	2.92	1.71	0.34
V26	3.08	1.75	0.33
V27	3.86	1.97	0.26
V28	2.17	1.47	0.46
V29	2.24	1.50	0.45
V30	2.61	1.62	0.38
V31	2.78	1.67	0.36
V33	4.14	2.04	0.24
V34	3.49	1.87	0.29
V35	5.13	2.27	0.19
V36	3.42	1.85	0.29
V37	2.56	1.60	0.39

Table 2. *Cont.*

Item	VIF	ISE	Tolerance
V38	1.87	1.37	0.53
V39	3.79	1.95	0.26
V40	2.16	1.47	0.46
V41	3.24	1.80	0.31
V44	2.12	1.46	0.47
V45	2.97	1.72	0.34

Note: The variance inflation factor (VIF) should be below 10 for low multicollinearity (Hair et al., 2006). The increased standard error (ISE) shows the effect of VIF on the standard error. Tolerance is the variability of an independent variable not explained by the other independent variables (an inverse relationship with VIF).

One suggestion to address multicollinearity is to eliminate the independent variables with higher VIF, if a theoretical motivation exists (O’Brien, 2007). The decision was to eliminate variable V10 (“We are all engaged in problem solving (we work effectively together)”) as it is semantically similar to variable V35 (“We do our best to make the project work”). After this procedure, we had no VIF greater than 4.52. Table 3 shows no issues with multicollinearity with the boredom variables.

Table 3. Multicollinearity analysis for Boredom.

Item	VIF	ISE	Tolerance
T1	2.03	1.42	0.49
T2	2.25	1.50	0.44
T3	1.61	1.27	0.62
T4	1.64	1.28	0.61
T5	1.54	1.24	0.65
T8	1.92	1.39	0.52
T9	1.47	1.21	0.68
T10	1.56	1.25	0.64
T11	1.78	1.33	0.56
T12	1.99	1.41	0.50
T13	1.84	1.36	0.54
T14	1.93	1.39	0.52
T15	2.02	1.42	0.50
T16	1.76	1.33	0.57
T17	1.49	1.22	0.67
M2	1.42	1.19	0.70
M12	1.38	1.17	0.73
M19	1.50	1.23	0.67
M21	1.66	1.29	0.60

Note: The variance inflation factor (VIF) should be below 10 for low multicollinearity (Hair et al., 2006). The increased standard error (ISE) shows the effect of VIF on the standard error. Tolerance is the variability of an independent variable not explained by the other independent variables (an inverse relationship with VIF).

In the comparative analysis between Nagelkerke’s R^2 for flow and boredom (0.35) and for flow and vibration (0.49), the variables measuring vibration had greater influence

on flow than the variables measuring boredom. However, caution is needed here, since a binary score was derived from the flow score. To mitigate potential threats to subsequent inferences (Osborne, 2005), we implemented specific regressions considering each flow variable as a dependent variable. We employed logistic regression, considering that the models do not assume homoscedasticity, normality, and linearity of data, and also considering that they allow for analyses of likelihood of each independent variable on the variance of the dependent one (Peng et al., 2010). Table 4 describes the results for each flow variable as a dependent variable, with all boredom variables as predictors. As shown in Table 4, all boredom variables explain ($R^2 \geq 0.12$) each of the flow variables and their aggregate score.

Table 4. Regression results for Boredom explaining each Flow variable.

Dependent Variable	Frequency of Responses					Log-Likelihood	R ²	p-Value
	1	2	3	4	5			
F01	1		8	69	97	59.43	0.35	<0.0001
F02		2	13	74	86	65.09	0.36	<0.0001
F03	2	5	35	94	39	40.70	0.23	0.0026
F04	5	12	44	79	35	62.63	0.32	<0.0001
F05	50	47	44	30	4	34.06	0.18	0.0181
F06	2	8	43	77	45	20.38	0.12	0.3721
F07	37	29	46	30	33	22.50	0.12	0.2600
F08		2	13	56	104	26.55	0.16	0.1155
F09	2	3	24	69	77	57.97	0.31	<0.0001
Flow score						63.97	0.30	<0.0001

Note: The frequency of responses shows the number of responses given to each point on a five-point Likert scale.

Table 5 describes the results for each flow variable as a dependent variable, with all vibration variables as predictors. As shown in Table 5, all vibration variables explain ($R^2 \geq 0.18$) each of the flow variables and their aggregate score.

Table 5. Regression results for Vibration explaining each Flow variable.

Dependent Variable	Frequency of Responses					Log-Likelihood	R ²	p-Value
	1	2	3	4	5			
F01	3	3	3	45	106	60.22	0.38	0.0037
F02	31	29	45	42	13	37.79	0.22	0.3000
F03	1	2	6	52	99	62.71	0.39	0.0019
F04	2	3	11	69	75	67.05	0.39	0.0006
F05	4	9	27	77	43	51.67	0.30	0.0266
F06	4	5	11	79	61	54.17	0.32	0.0154
F07	18	25	33	43	41	31.61	0.18	0.5854
F08		1	6	27	126	39.16	0.30	0.2493
F09	3	1	14	37	105	79.96	0.45	<0.0001
Flow score						60.99	0.31	0.0030

Note: The frequency of responses shows the number of responses given to each point on a five-point Likert scale.

Table 6 shows the *t*-tests for hypothesis H3. As for the effect size, the average flow score when measured with boredom (3.83; SD = 0.47) is below the average flow score when

measured with vibration (4.11; SD = 0.55), thus suggesting an influence of negative/positive phrasing of the constructs of boredom and vibration on the perceptions of flow. This is especially supported by the statically significant (p -value < 0.000) difference between flow scores when measured with boredom or vibration. Table 6 also shows the individual t -tests for each flow item in the two datasets. Only F01 (“*I feel I am competent enough to meet the high demands of the situation*”) was not significant ($p > 0.05$) for the differences between negative and positive flow items. F06 (“*I am completely focused on the task at hand*”), F07 (“*I am not worried about what others may be thinking of me*”), F08 (“*The way time passes seems to be different from normal*”), and F09 (“*The experience is extremely rewarding*”) were significant at $p < 0.005$. The other variables were significant at $p < 0.001$. The statistical results suggest that the three hypotheses can be accepted.

Table 6. t -tests for each Flow variable in the datasets.

Flow Variable	χ^2	p -Value
F01	0.7396	0.4600
F02	−13.9249	<0.0001
F03	7.4434	<0.0001
F04	6.2781	<0.0001
F05	13.5042	<0.0001
F06	3.0004	0.0029
F07	2.9619	0.0032
F08	3.5401	0.0004
F09	2.9147	0.0003
Flow scores	4.9581	<0.0001

6. Discussion

This section recalls the key ideas of the present study and summarizes the main findings based on the statistical data above.

In some situations, the phrasing of items in a questionnaire can influence the correlation of constructs (Schaufeli et al., 2008). Flow, being a latent construct, has been measured for three decades in association with other constructs (Jácome de Moura & Porto-Bellini, 2019b), and such practices of measurement may have biased the understanding of the willingness of certain professional groups to really experience flow. Therefore, one of the implications of the present study is to warn researchers to be cautious when processing flow scores in general and for IT professionals in particular. Also, certain phrasing in questionnaire items may favor the emergence of response biases, thus possibly triggering cognitive disruption as per the expected information asymmetry between the “audience” (researchers) and the “performers” (respondents). This may end up with respondents adopting a response pattern that is consistent with an image they want to forge.

Another measurement problem refers to how one’s image is constructed and institutionalized. Once such an image is assumed by the “performers” (the IT professionals) and the “audience” (society), its characteristics become part of the performers’ “moral commitment” (Goffman, 1978). Disruption may thus emerge in the mind of the IT professionals when they see items in a questionnaire that support or challenge that moral commitment, including the possibility that they change previously provided responses (i.e., by returning to previous sections of a data collection instrument). Such a behavior of manipulating—for better or for worse—the responses given to self-reported, perception-based psychomet-

ric surveys is in accordance with the theoretical assumption that people will engineer a convincing impression through moral commitments.

Much like those reported in the literature, the scores for flow in the present study suggested a tendency of IT professionals to advocate a positive impression of themselves (Candatten et al., 2013) and a propensity to be in flow (Licorish & MacDonell, 2017). In fact, the scores for flow were higher when measured with vibration than when measured with boredom. The significant variation in flow scores depending on which construct it was measured with can be interpreted as part of impression management's *framework of appearances* (Goffman, 1978) and the tacit agreement between the actors (here, the IT professionals) and the audience (here, the general society). Also, information asymmetry being an assumption of impression management, it is reasonable to assume that IT professionals do not share their real dilemmas, contradictions and intentions, rather espousing a socially expected image.

However, how can such an asymmetry be sustained? One possible answer is through meeting expectations. For example, in this study's data, average boredom levels were low (2.1; SD = 0.6) and flow levels were high (3.83; SD = 4.7). This may mean that, if the expectation is negative (i.e., it does not correspond to an intended image), the individual will assign low values to the measurement items; but if the expectation is positive (i.e., it corresponds to an intended image), the individual will assign high values to the items. Therefore, IT professionals would report high levels of enjoyment with their work context with the intention of preserving a socially institutionalized image, even if the literature also describes the presence of fatigue, job dissatisfaction, work-home conflict, and numerous other negative issues among IT professionals. As such, observable behavior is a more reliable indicator of an IT professional's commitment to—and mood in—the profession than responses given to self-reported, perception-based questionnaires.

Moreover, expectations are tacitly negotiated so that the social interaction becomes defined, predictable, and organized (Goffman, 1978). The occurrence of boredom in the workforce is undesirable both for workers and employers—and workers are not expected to manifest it. So, when boredom-related questions are presented to IT people, cognitive dissonance arises. The cognitive balance may be restored through mental trickery (Festinger, 1964) such as in overvaluations of the self-image (e.g., low levels of boredom and high levels of flow) and the adaptation of beliefs (e.g., high levels of engagement, integration, and team collaboration). In this sense, flow and vibration may be seen as defense mechanisms, as predicted by Vaillant (2000) in regard to positive psychology.

Such findings suggest the attenuation of cognitive dissonance as a defense mechanism triggered by cognitive incompatibilities and employed to sustain impression management, much like how it is proposed in the present study for the relationship between flow, cognitive dissonance, and impression management in Figure 1. The findings also corroborate the position of Csikszentmihalyi (1990) and Vaillant (2000) that defense mechanisms do not always imply a negative psychological condition, since such mechanisms can also restore psychological homeostasis by reducing dissonance and the emerging conflicts, while the individual will not necessarily develop pathologies or psychoses. The individual's identification with the experience of flow—in full or not—would thus emerge as a defense mechanism when answering to flow items in a questionnaire. Such an identification acts positively, not in the sense of creating false beliefs (for instance, the illusion of enjoying work when the individual in fact does not), but in promoting the balance of conflictual interests. Flow is in fact seductive as the activity being performed entertains and alleviates the anguish of having to deal with the self and the work environment. Moreover, it justifies the socially endorsed time and effort devoted to work.

6.1. Contributions to Theory

This study provides evidence for the defense mechanisms that manifest through flow. It also supports the conjecture that IT professionals would adopt strategies of impression management, thus opening a new empirical field for that theory. In addition, the present study advocates a counterintuitive perception that the IT profession may not be as ludic and immersive as generally reported in the literature. IT people would strive to build a socially legitimized image of their professional occupation through institutionalization processes that include the questionnaire-filling strategies here described, which are coherent with the social construction of reality (Berger & Luckmann, 1967) and with known biases such as those of acquiescence and social desirability.

6.2. Contributions to Practice

Researchers and work supervisors should be cautious when handling self-reported measures collected from IT professionals about themselves, their cohorts, and the routines at work, particularly regarding flow and related phenomena. Instead, observable behavior is likely to be a more realistic indicator to describe the work climate, the routines, and the mood of those individuals. When interviewing workers, the hiring personnel and the supervisors in organizations should carefully craft questionnaires that minimize the occurrence of acquiescence and social desirability biases as well as the influence of hidden intentions motivated by impression management. While the use of questionnaires in hiring processes—particularly personality tests—has been criticized for sometimes locking prospective workers in difficult choices (O’Neil, 2017), the present study suggests that respondents might game the system too with answering strategies.

6.3. Limitations

This study has limitations. First, it assumes that threats to impression management trigger cognitive dissonance, and that an individual’s answering patterns in flow-related questionnaires manifest dissonance-attenuation mechanisms in such cases. Therefore, if the assumptions are proved not valid, the study is at risk. Second, the study is based on secondary data; while this is not a problem per se, it poses potential threats to the validity and the scope of inferences (Houston, 2004). Third, there was no control over the organization of items in the questionnaires that were analyzed in order to test any possible effect of different organizations on the respondents’ answering patterns. Fourth, there was no testing for Bowling et al.’s (2021) finding that participants may respond more carelessly as they progress through a questionnaire. And fifth, this study does not provide objective measures on the actual manipulation of answers by respondents. Instead, it infers the likelihood of such manipulations by discussing correlations of response patterns found in a positive-positive dataset (flow-vibration) and in a positive-negative dataset (flow-boredom), as well as by contrasting those correlations with parts of the IT occupational literature describing the presence of negative issues like fatigue, job dissatisfaction, and work–home conflict among IT professionals.

6.4. Future Studies

One opportunity for future research is to carry out experiments to verify the manipulation of questionnaires by respondents. For instance, online forms can track the changes in answers and identify certain behavioral patterns after a respondent realizes what a questionnaire is trying to measure and how it was crafted. Such an experimental design should place the questions in a way that promotes cognitive disruption and captures the efforts towards balance—like the overvaluations of self-image and the adaptation of beliefs—while tracking the respondent’s digital footprints when answering the questions back and forth.

Future studies may also address the agency role of general society and of researchers in institutionalizing the image of the IT profession and its members. And a last suggestion for future studies concerns an intrinsic problem in the study of impression management, particularly with self-reported psychometric data, i.e., impression management can be either deliberate or unconscious (Bolino et al., 2016; Aronson & Aronson, 2007). Since there is no other study on such a phenomenon in the IT profession to inform what dominates the IT professionals' attitudes and behaviors, the present study may provide insights for upcoming research on the topic.

7. Conclusions

The IT profession has millions of workers worldwide who generally share a positive reputation, including being described among the best examples of professionals who achieve a state of flow both at the individual and team levels when performing a task. The scholarly literature indeed describes IT professionals in a mostly stereotypical manner—as talented people with high employability and enjoying what they do. While this study does not challenge the general validity of such an image, it posits that part of such an image may be due to practices of impression management effected by the very IT individuals when reporting issues about themselves, their cohorts, and their work routines. Such practices may be just as natural, whereby people (of any professional occupation) value their work and their professional investments, while the layperson also acknowledges the importance and the appeal of IT work. Nevertheless, the present study encourages researchers to discuss what is fact and what may pertain to imagination in this regard.

This study also offers evidence of the role of flow in restoring the cognitive balance of IT professionals, particularly on the assumed ludic, immersive way of dealing with work. Self-reported, perception-based psychometric instruments of data collection contribute to propitious responses, as if IT people perceived threats to their moral commitment with themselves, their profession, and the general society—and as a result, they strategically manage the answers given to questionnaires, or do it unconsciously.

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