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**Linking physicians' medical practice information needs,
resources and barriers to job satisfaction: A moderated
mediation model**

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Review

1. Introduction

Medical doctors of all specialties, within their everyday working environment, encounter a wide variety of information needs surrounding their key professional activities that support the quality of clinical decisions, safe patient care and their own continuous professional development. However, with the ever increasing advances and changing practices of the medical field (Anker *et al.*, 2011) and the constantly expanding medical information space (Masters, 2008; Kritz *et al.*, 2013; Robson and Robinson, 2015) it has become more difficult to keep up with trusted and good quality online information. Previous research within the healthcare information landscape has explored the complexity of physicians' information needs in the context of different professional roles, their preferred information resources and the barriers they encounter in the process of information seeking, such as lack of time, IT issues and limited search skills (Davies and Harrison, 2007; Prendiville *et al.*, 2009; Younger, 2010; Anker *et al.*, 2011; Clarke *et al.*, 2013). From this stream of research it is clear that effective information seeking and the use of online scholarly information resources, in particular, provide a crucial vehicle for supporting clinical practices in order to address a wide range of information needs surrounding priority professional areas such as diagnosis, medical questions on prescription drugs, and patient education, as well as research activities and scholarly communication (Masters, 2008; Kritz, *et al.*, 2013).

Despite the recent growth of research that examines information seeking behaviour within healthcare related contexts, demonstrating a potential connection between information seeking competencies and the effectiveness of key professional practices, so far, there has been little effort to explore the impact of information seeking dimensions on issues of key organizational concern, such as that of employees' affective attitudes and particularly job satisfaction. In a recent review of information literacy in the workplace, Williams *et al.*, (2014) note, however, that in order to establish the relevance and significance of the impact of information competencies, greater evidence is required that should be "expressed in terms that relate to industry and professional priority areas, on the basis of, for example, business success, organizational competitiveness, profitability, resilience, effective decision-making", which are meaningful beyond an information science context.

2. Previous research on job satisfaction

A prominent definition of job satisfaction in the research literature describes it as “a pleasurable or positive emotional state resulting from the appraisal of one’s job or job experiences” (Brief and Weiss, 2002). A more multidimensional definition of job satisfaction argues that job satisfaction emanates from both work and environmental factors (Spector, 1997). In that sense, job satisfaction may be associated with the level of a individual satisfaction that results from one’s actual job, whereas environmental satisfaction, within a clinical setting in particular, encompasses factors or conditions, that affect all employees such as, clinical supervision systems, working hours and physical space (Duffy and Richard, 2006). In the research literature that focuses on job satisfaction, numerous empirical studies have revealed that this core employee affective state is predicted by various dispositional and situational factors including personality (Judge *et al.*, 2002), job characteristics (Thomas *et al.*, 2004), organizational culture (Lok and Crawford, 2004) and leadership styles (Braun *et al.*, 2013). Likewise, substantial empirical research has shown that job satisfaction plays a key role in affecting core work and non-work outcomes including counterproductive work behaviour (Mount *et al.*, 2006), turnover intention (Egan *et al.*, 2004), absenteeism (Ybema *et al.*, 2010) and health (Faragher *et al.*, 2005).

Job satisfaction has dominated organizational literature due to its salient role in predicting core work and employee outcomes. In examining potential determinants of this construct various theoretical approaches have been proposed. These approaches can be separated into four broad categories (Weiss and Cropanzano, 1996): a) Cognitive Judgment approach, b) Social Influence approach, c) Dispositional approach and, more recently, d) Affective Events Theory. Taken together, these theories suggest that job satisfaction partly emanates from employees’ emotional experiences at work and the beliefs they have about their job (Fisher and Ashkanasy, 2000). Within the healthcare literature in particular, a plethora of empirical studies have been conducted using these theories that investigate both antecedents and outcomes of physicians’ job satisfaction. Bovier and Perneger (2003) argued that five determinants of physician job satisfaction occur, namely patient care, work-related burden, income-prestige, personal rewards and professional relations with colleagues. On the basis of these, they found that physicians reported the

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3 highest levels of satisfaction for patient care, professional relations and personal rewards.
4 In a related vein, Duffy and Richard (2006) indicated that patient care, sense of
5 accomplishment, continuity of care, autonomy, and personal time are the most salient
6 sources of job satisfaction. In addition, an increasing stream of research has shown that
7 workload and working conditions affect negatively physician job satisfaction (Van Ham
8 *et al.*, 2006) whereas participation in decision-making, working relationships, emotional
9 intelligence and emotional labour have a positive impact. (Janus *et al.*, 2008;
10 Psilopanagioti *et al.*, 2012). Similarly, physician job satisfaction has been shown to be
11 related to various other outcomes including patient satisfaction and adherence, intention
12 to quit, and burnout (Di Matteo *et al.*, 1993; Ozyurt *et al.*, 2006; Sibbald, *et al.*, 2003;
13 Hann *et al.*, 2010; Zhang and Feng, 2011).
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22 Despite the proliferation of empirical studies that have encompassed job satisfaction
23 within healthcare settings, the impact of information seeking behaviour related
24 parameters on job related satisfaction in the context of physicians' work is still an
25 underexplored research area.
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32 3. Rationale

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34 The affective events theory developed by researchers working within the organizational
35 psychology domain (Weiss and Cropanzano, 1996) posits that internal affective
36 experiences may be a salient source of job satisfaction. Events at work (that can be either
37 negative, such as time/ job pressures, conflicting information about job tasks or positive,
38 such as reward systems, positive actions of co-workers, and suitable work tasks)
39 influence employees, triggering internal influences or emotional responses, cognitions
40 and mental states that in their own turn have a significant impact on employee
41 performance, organisational commitment and job satisfaction. In this way, within
42 information rich working environments, effective information seeking may be perceived
43 as a key activity inducing productive work behaviour with positive emotional
44 occurrences that lead to job satisfaction. Within information seeking research "affective"
45 states refer to the emotional condition of the user during information seeking, and may
46 include feelings of frustration, anxiety, impatience, information overload and resistance
47 to new information, which may become significant barriers to the search process (Nahl
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3 2001). Nahl (2001) found that insecurity and doubt of one's information-searching
4 abilities may lead to little effort and resistance to new information, which may have a
5 negative impact on the search process. Some individuals may also be more susceptible to
6 feelings of stress and worry in an information seeking context (Heinström, 2002). The
7 feelings of an individual can affect their performance in an information retrieval task but
8 also a person's feelings may be affected by performing a task (Wang *et al.*, 2000). In
9 addition, many people may express an escape reaction to a threatening situation in which
10 there is a history of failure, such as when using a complex information retrieval system.

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17 According to Mooers' law, "an information retrieval system will tend not to be used
18 whenever it is more painful and troublesome for a customer to have information than for
19 him not to have it" (Mooers, 1959, p. 1). This tendency may be explained in terms of
20 cognitive avoidance, or turning attention away from the threat (Krohne, 1993). The
21 cognitive styles of attention and avoidance, for example, are psychological traits of the
22 individual that predispose the person towards searching for more information in a
23 stressful situation, or towards avoiding information acquisition. Although the process of
24 information seeking may involve a plethora of negative experiences such as those
25 described above; it can also trigger positive responses (Fulton, 2009) such as excitement
26 and satisfaction (Solomon, 1997). When a search is successful, an information seeker
27 may also experience feelings such as joy, interest and exhilaration, which motivate
28 him/her to continue and engage in more complex searches (Nahl, 2001). As confidence
29 becomes stronger, the negative affective situations in which the searcher is initially found
30 are transformed in the later stages of the information seeking process when relevant
31 materials collected increase the confidence of the user and are replaced by feelings of
32 relief, satisfaction and certainty (Kuhlthau 1993).

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45 Other researchers such Fulton (2009), have discussed the interplay between information
46 seeking activities, positive affective responses and the development of skills. In addition,
47 other scholars have argued the important role of information seeking and exploration in
48 the learning process (Dewey, 1933; Marchionini, 2005. Marchionini (2005), for example,
49 has noted, in more detail, that learning occurs through a plethora of mechanisms
50 including knowledge acquisition, comprehension and interpretation, comparison,
51 aggregation and integration and socialization. At the same time, within the context of
52 management and organizational research, an information-rich activity such as personal
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3 learning has been found to be associated with job satisfaction (Lankau and Scandura,
4 2002).

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7 Finally, an additional rationale for the present relationship is drawn from self-efficacy
8 theory which refers to an individual's perceptions of their ability to accomplish a task
9 (Bandura, 1997). Previous studies have argued that information seeking enhances self-
10 efficacy (Zhu *et al.*, 2011). Similarly, David *et al.*, (2007) demonstrated that when
11 individuals meet their information goal successfully, they experience high levels of self-
12 efficacy. This is supported by further evidence which suggests that newly appointed
13 employees in particular may have increased job satisfaction when they are engaged in
14 frequent information seeking (Morrison, 1993). Combining these findings with previous
15 studies across various occupations that have reported a positive relationship between self-
16 efficacy and job satisfaction (Caprara *et al.*, 2006; Nielsen *et al.*, 2009; Wang *et al.*,
17 2010) we may therefore anticipate that information seeking may also be connected to job
18 satisfaction levels. This may be attributed to the reduction of uncertainty that occurs
19 through information seeking.
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23 Thus information seeking within information intense work settings in particular, such as
24 in the case of clinical work is an activity that evokes affective responses such as self-
25 efficacy; it is also a mechanism via which learning experiences take place and thus may
26 present a salient source of job satisfaction.
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45 **4. Theoretical framework and study hypotheses**

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47 In his research, information seeking is viewed as an effort to satisfy a set of needs which
48 are triggered by the demands created within the working context, following Wilson's
49 (1999; 2000) information behaviour framework, which advocates a person centered
50 approach, focusing on the "human aspects of use", information needs and the context in
51 which information needs arise, These are influenced by professional "roles" that require
52 goal-directed information seeking for the purposes of reducing uncertainty (Wilson *et.*
53 *al.*, 2002) and during the process of information seeking a variety of different information
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3 seeking obstacles may be encountered. Within that framework, this research, examines
4 medical doctors' key information needs that lead them to engage in information seeking
5 with the purpose of fulfilling specific job related objectives within their professional roles
6 (Wanberg and Kammeyer-Mueller, 2000). The research postulates that the satisfaction of
7 information needs can have a positive impact on pursuing a wide variety of
8 multidimensional work related tasks, whether those are clinical (e.g. diagnosis,
9 treatment), educational (e.g. academic achievement, teaching, professional development)
10 or personal (e.g. sense of accomplishment, achievement). Information seeking can take
11 place using a variety of information sources, including offline information channels
12 (printed material, personal and/or hospital libraries), interpersonal information sources
13 (e.g. colleagues of different or of the same specialty) or online information sources,
14 which can be scholarly or more general, such as commercial search engines.
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24 Although physicians use a combination of formal and informal sources during
25 information seeking for everyday medical practices, they mostly trust specific
26 information resources when it comes to satisfying precise information needs that depend
27 on a clinical situation (Koopman *et al.*, 2015). The concept of trust arises within the
28 setting of risk involved within the decision making process and incorporates the ways in
29 which individuals assess and choose information resources (Hertzum *et al.*, 2002). Online
30 scholarly information sources present one of the most significant means for identifying
31 necessary evidence-based clinical research (e.g. disease or patient oriented) that
32 underpins effective medical practice and these sources are important for retrieving trusted
33 information in an efficient and reliable manner (Kostagiolas *et al.*, 2014).
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42 Within this context, the research investigates the use of online scholarly information
43 sources by physicians for their medical practice information needs (MPIN) (e.g.
44 information for drugs, epidemiology, patient information, research and teaching), the
45 information seeking related barriers they encounter (such as unfamiliarity with
46 information seeking methods and computer skills, lack of trust in online information and
47 lack of English language competencies as appropriate within the geographical context of
48 this study). These information behavioural dimensions are examined in relation to the
49 role they play in physicians' overall job satisfaction.
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56 The research specifically puts forward the following hypotheses:
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3 *H1: The level of importance assigned to medical practice information needs (MPIN) is*
4 *positively related to the frequency of using Online Scholarly Resources (OSR).*
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7 *H2: The frequency of using OSR is positively related to job satisfaction.*
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10 Drawing insights from various theories and research arguments discussed above, we
11 therefore postulate that the more importance physicians assign to MPIN, the more
12 frequently they use OSR and this may affect their job satisfaction levels. More
13 specifically, we argue that the more physicians recognize their MPIN in order to mitigate
14 uncertainty, as part of their work role, the more frequently they employ OSR. Given the
15 positive affective experiences that may emanate from the use of scholarly online
16 resources on the basis of the accomplishment of successful work related activities,
17 physicians may experience enhanced job satisfaction. On the other hand, low recognition
18 of the importance of MPIN may signify lower use of OSR which in its turn, may be
19 associated with less successful work tasks and negative internal emotional affective
20 experiences that emanate from the use of such online resources; thus physicians may
21 experience reduced levels of job satisfaction.
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30 Building on this logic, we attempt to explicate the mechanism that accounts for the effect
31 of physicians' information seeking and particularly the recognition of the importance of
32 medical information needs and the use of quality information sources on their job
33 satisfaction. On this basis, we also argue that if we accept that employees' development,
34 growth and achievement may produce elevated levels of satisfaction– and information is
35 crucial towards achieving these goals – the study of employees' information needs as
36 well as of information sources utilized to facilitate effectively their fulfillment, is crucial
37 for the satisfaction of their professional aims and therefore of job satisfaction. In this
38 regard, doctors that are in a position to recognize the significance of their information
39 needs related to key professional medical activities are more likely to be active in
40 information seeking using online scholarly resources that involve systematic and focused
41 searches for well-defined information needs.
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51 According to Wilson (2006) information seeking within a specific context or
52 environment (such that of work) is triggered by the satisfaction of information needs (that
53 are linked to broader basic needs that can be of a psychological/affective or cognitive
54 nature – the need for attainment, for domination, the need to plan, to learn a skill). Thus,
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3 without experiencing a need (and thus a need for information) information seeking may
4 not take place in the first place. This may be specifically the case for information seeking
5 that involves the use of complex information retrieval systems (such as scholarly medical
6 databases and journals) that require a complex set of skills and investing time in order to
7 be successful. Therefore, recognising the importance of ongoing information needs
8 within the constantly changing information landscape of the medical profession may act
9 as a mediator on the basis of making the positive relationship between OSR and job
10 satisfaction to take place.
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17 So far, we have posited that physicians' level of importance assigned to their information
18 needs may lead to more frequent use of OSR and in turn increased job satisfaction
19 (Hypothesis 2). As a result of this relationship we argue that:
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23 *H3: The level of utilization of OSR mediates the relationship between the importance*
24 *given to MPIN and job satisfaction.*
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27 The literature reveals that medical doctors face a number of obstacles that enable or
28 prohibit usage of online scholar information resources. (For example, Bernard *et al.*,
29 (2012) reported that cost and time constraints impact the way medical practitioners seek
30 trusted information for their daily practice. Other barriers that may arise when using
31 OSR, include those related to the lack of information and digital literacy skills, the need
32 to master foreign language skills to interpret information (especially when English is a
33 second language) as well as barriers which arise from the work environment, such as,
34 among others, access to OSR, their ease of use and computer infrastructure availability.
35 Research suggests that information related barriers influence the utilization of OSR for
36 satisfying information needs related to medical work activities (e.g. Davies, 2011;
37 Younger, 2010). Therefore, the medical practice information needs cannot be addressed
38 appropriately on online scholarly resources in the presence of information barriers (Anker
39 *et al.*, 2011). Thus, information related barriers are likely to moderate the relationship
40 between MPIN and OSR utilization which in turn may mitigate job satisfaction. Hence,
41 we suggest a moderated mediation model which jointly examines the use of MPIN as the
42 mediating mechanism and information related barriers as a moderator. More specifically,
43 we postulate that there is an indirect effect of physicians' use of OSR on job satisfaction
44 and that this is contingent on the information barriers that physicians experience.
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We therefore put forward our final hypotheses as following:

H4: Information related barriers moderate the relationship between the frequency of using OSR and the level of job satisfaction.

H5: Information related barriers moderate the indirect relationship between MPIN and job satisfaction through the use of OSR.

{INSERT TABLE 1 AROUND HERE}

5. Survey design and results

5.1 Participants and Procedure

In order to test the above hypotheses, the research collected empirical data via a questionnaire survey of 138 medical doctors working at a University Hospital in Thessaly, in Central Greece. The profile of the research population had a balanced distribution of demographic characteristics on the basis of gender (55.1 % were male), age (56.5% were below 40 years old), medical specialty (40.6% were pathologists) and professional experience (47.8% had already completed their specialization). The sample profile is summarized in Table 1.

Although the present study has been conducted within a limited and quite specific context to be in a position to generalise the findings, it highlights important considerations related to information related components in the study of job satisfaction that may provide a useful framework for future research. The relationships between the different variables examined in this study are complex and deserve an individual focus on the basis of each one of the information related parameters (information needs, online scholarly sources and information related barriers) as well as job satisfaction which presents a complex area of investigation in its own right. However, the purpose of the present study is to put forward a set of hypotheses or propositions for making further empirical connections between information related variables and organisational activities and particularly work-related attitudes such as job satisfaction that are key to organisational performance.

5.2 *Questionnaire development and methodology*

Prior to its distribution, the questionnaire was pilot tested by a group of experts (medical directors and academics) for validity and approved by the scientific committee of the hospital. The medical directors and well as the members of the University Hospital Scientific Committee represent all medical specialties; they have a profound research record and significant clinical experience. The academics were University Professors from two institutions (Hellenic Open University and Ionian University) with significant research experience in healthcare information services management and healthcare management. After the pilot study, the survey took place between February and March 2014 and involved all medical doctors registered at the University Hospital. The questionnaire in its final form collected demographic characteristics and three key information seeking layers informed by Wilson's macro model for information seeking (Wilson, 2006): the level of importance doctors assign to their medical practice information needs, the frequency of utilization of online scholarly resources and the presence of information seeking barriers. The questionnaire also collected data on job satisfaction levels of doctors.

The information collected about demographic characteristics included gender (1 = male, 2 = female), age (1= below 40, 2= between 40 and 50, 3= 51-60, 4=above 60), employment sector (1= pathology, 2= surgery, 3= laboratory), employment level (1=Professor/Associate Professor/Director, 2= Assistant Professor/ Associate Clinical Director, 3= Specialized doctor).

The frequency of medical practice information needs was assessed in relation to respective common areas doctors typically search for information, such as information for drugs, epidemiology, patient information, research and teaching. The Cronbach alpha for this scale was 0.78. The utilization of online scholarly information resources was measured using two items, the online scientific databases and journals. The Cronbach alpha for this scale was 0.73. Information related barriers included unfamiliarity information seeking practices, unfamiliarity with the use of a personal computer, lack of trust in digital information and difficulty in understanding foreign language information. The Cronbach alpha for this scale was 0.70.

A number of other information barriers such as cost, time and access to or lack of library services been considered in previous research (Green and Ruff, 2005). However, it was

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3 decided that these are not directly relevant to the purposes of this study (as they refer to a
4 specific environmental context regulating most of these issues). In addition this research
5 did not aim to examine in detail doctors' individual differences and information needs
6 priorities but to explore at a higher level the association between key medical practice
7 related information needs, the use of online scholarly resources, relevant information,
8 digital literacy barriers and overall job satisfaction. Job satisfaction was assessed using
9 three items taken from the Michigan Organizational Assessment Questionnaire
10 (Cammann *et al.*, 1979). Items were "All in all, I am satisfied with my job", "In general, I
11 don't like my job" and "In general, I like working here" (1=strongly disagree to
12 5=strongly agree). The Cronbach alpha for this scale was .70.
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{INSERT TABLE 2 AROUND HERE}

23 24 25 26 27 28 **6. Results**

29 The research instrument and the descriptive statistics are included in the Appendix. Given
30 that these scales have not been tested before, we conducted an exploratory factor analysis
31 (EFA) with a varimax rotation on the above variables. The aim of the factor analysis was
32 to group together and to describe correlated variables into a lower number of key factors.
33 Therefore, the study of the interdependencies between the studied variables presented
34 was reduced to a number of joint datasets or combined factors in the four core areas
35 (information needs, online scholarly resources, barriers and job satisfaction) that could be
36 examined in correlation to each other as broader areas of focus. In that way it was
37 possible to establish their relationship on a broader and more inclusive level. Results
38 (Table 2) from this analysis showed that these four distinct factors pertain to the
39 respective items also demonstrating high loadings (from .54 to .82). Table 3 presents the
40 means, the standard variations and the correlations between the four key variables of the
41 study.
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51 In order to examine our present hypotheses we conducted regression analysis,
52 hierarchical moderated analysis and bootstrapping using SPSS macro developed by
53 Preacher and colleagues (2007). Regarding the mediation analysis, the results (Table 4)
54 showed that when a higher level of importance was given to MPIN this had a positive
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3 effect on the frequency of using of OSR ($B = .25, p < .01$) supporting our first hypothesis.
4 In other words, the more the doctors recognised their information needs related to key
5 work activities the more likely it was for them to use OSR. Furthermore, results
6 demonstrated that the higher the use of OSR the more positive job satisfaction was ($B =$
7 $.29, p < .01$). This evidence supports our second hypothesis. However, MPIN presents a
8 non-significant relationship on the basis of job satisfaction directly ($B = .10, n.s.$). On the
9 other hand, bootstrap results for indirect effect support our mediation hypothesis since the
10 bias corrected confidence interval of the specific indirect effect did not contain zero
11 (ranging between .02 and .20). Taken together, we therefore provide evidence for a full
12 mediation model that links MPIN to job satisfaction indirectly through the use of OSR.
13 That is, MPIN enhances the use of OSR which in turn augments physicians' levels of job
14 satisfaction, which provides support for our third hypothesis.
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33 In addition, hypothesis 4 postulated that the relationship between MPIN and the use of
34 OSR is moderated by personal barriers. Results (Table 6) showed that that the interaction
35 of MPIN with personal barriers was significant in predicting the use of OSR ($B = -.30 p <$
36 $.01$). As such, when information related barriers are low the effect of MPIN on the use of
37 OSR is stronger compared to conditions of high information related barriers. In order to
38 further explore the nature of this interaction we conducted slope analysis. Slopes (Figure
39 2) indicated that for low information barriers there is a significant positive relationship
40 between the importance of MPIN and the use of OSR ($\beta = .48, p < .01$) whereas for high
41 information barriers this relationship is not significant ($\beta = -.04, n.s.$). Hence, hypothesis 4
42 was also supported.
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53 **{INSERT TABLE 5 AROUND HERE}**
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55 **{INSERT FIGURE 2 AROUND HERE}**
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Finally, we examined the moderated mediation hypothesis. To support this hypothesis (Hypotheses 5), the indirect effect should vary across the different levels of the moderator (one standard deviation below and above the mean). Results (Table 6) revealed that the indirect effect of MPIN on job satisfaction was significant across low levels of personal barriers (effect= .14, $p < .05$; CI between .04 and .35), but it was not significant across high levels of personal barriers (effect= -.01, n.s.; CI between -.12 and .04). Thus, hypothesis 5 was supported. That is, when physicians experienced barriers regarding their information seeking the positive indirect effect of MPIN on their levels of job satisfaction via OSR was negated. On the contrary, for physicians who did not have significant information barriers when seeking for information, MPIN significantly affected their job satisfaction through OSR.

{INSERT TABLE 6 AROUND HERE}

7. Discussion

To date, there has been no comprehensive study investigating the relationship between information needs, resources, information related barriers and job satisfaction within the context of healthcare. We posit that our work provides a pathway to understanding the role of information in advancing the theoretical understanding of the conditions that underpin physicians' job satisfaction. Our empirical investigations demonstrated that a positive relationship exists between the use of online scholarly sources (OCR), the satisfaction of medical practice information needs and the overall job satisfaction of physicians. In particular, our work demonstrated that recognition of work-related information needs, leads physicians to make demands upon particular formal information channels, online scholarly information resources, and that when information related barriers are low these resources are likely to be used more. The research results also demonstrate that satisfying work-related information needs using online scholarly resources may lead to overall job satisfaction. These results are significant within the context of research which examines organizational and work predictors of job satisfaction (Van Ham *et al.*, 2006; Janus *et al.*, 2008; Psilopanagioti *et al.*, 2012) as they illustrate the vital role of information related parameters (in particular the use of OSR and

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3 information barriers) on this outcome. Job satisfaction is a complex construct with a
4 range of different dimensions and its predictors are highly context specific and related to
5 organizational conditions. It also depends upon how these conditions are
6 viewed/perceived by employees based on their own experiences and expectations. For
7 example, previous research has found that work-related burden (e.g. workload, work-
8 related stress, increasing time based on administrative responsibilities) has a negative
9 effect on satisfaction, whereas, increased working experience, the exercise of specific
10 specialties (e.g. internal medicine specialties and pediatrics) and additional time spent on
11 continuing medical education influence positively job related satisfaction (Bovier and
12 Perneger, 2003). We argue that many of these personal and organizational constructs
13 which act upon job satisfaction take place within information rich working environments
14 and the examination of information related constructs is an important dimension which
15 requires specific emphasis in job satisfaction organizational research.
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19 Thus, from a theoretical perspective, our proposition is that the study of information
20 needs, information related barriers and the selection of online information scholar sources
21 which have been mainly considered in earlier research via a predominant information
22 science centric perspective (focusing on the satisfaction of information needs) - will need
23 to extend beyond that field of investigation, and embrace a new framework that invites
24 further empirical research with a focus on the impact of information related parameters
25 on work-based primary organizational objectives, and specifically the satisfaction of
26 affective needs in relation to physicians' specific working environment. Wilson's (1981)
27 model incorporates primary role-related and affective facets as well as the presence of
28 personal and contextual barriers, demonstrating broadly their connection to information
29 behaviour. For example, according to Wilson (2006) information needs "arise out of
30 needs of a more basic kind and in the effort to discover information to satisfy a need, the
31 enquirer is likely to meet with barriers of different kinds". However, evidence in the form
32 of empirical research of the value and/or impact of information related constructs in the
33 health workplace that is measurable and quantifies this relationship is scarce.
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37 The job satisfaction of physicians is a rather important matter with many organizational
38 implications as well as wider societal implications linked to ensuring the quality/safety of
39 health services provided to patients. OSR in health information seeking are among the
40 most popular information resources employed by medical doctors for patient-care and a
41 significant means by which physicians reduce uncertainty in relation to clinical decision
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3 making processes (Davies, 2011). Therefore, overcoming information obstacles in the use
4 of online information sources, depending on personal (e.g. lack of information and digital
5 literacy), demographic (age group, education, specialty) and contextual or work-related
6 factors (e.g. workplace status, availability and accessibility) is important for physicians in
7 order to be in a position to efficiently utilize the complex medical information space and
8 thus successfully fulfill their job activities. Work-related burden for example, could be
9 created within a situation in which an employee is experiencing information related
10 barriers, such as the lack of information and digital literacy which have been linked to
11 increased information overload. Lloyd (2013), for example, has postulated that in the
12 modern multimodal workplace (and this is particularly true of the medical workplace
13 environment) employees should have the information literacy skills to effectively address
14 information overload. Digital literacy and the ability to use effectively sophisticated
15 medical information seeking environments and interpret critically medical research are
16 also key in ameliorating conditions of information overload as well as workload and
17 increased work-related stress. Similarly, continuing medical education may be enabled by
18 a better understanding of personal development information needs, a critical awareness of
19 information gaps in the state of knowledge of an individual, which is a key information
20 literacy skill. Thus the evaluation of one's context related and personal information
21 related constructs and their impact on workplace satisfaction may help to address key
22 organizational barriers in specific health care settings linked to decreased levels of job
23 satisfaction.

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Job satisfaction is a multifaceted concept that includes a complex system of attitudes, values and beliefs. In this research we used a simple scale to measure overall job satisfaction. Future studies could explore different measures/ layers of satisfaction. For example, Spector (1997) identifies personal, cultural, gender and organisational causes in job satisfaction. The *Job Satisfaction Survey* assesses a variety of aspects such as supervision, communication, co-workers and the nature of work (Spector, 1994). Within this context, research could address a wide variety of information related aspects that span beyond the study of individual information seeking behaviour to exploring the value of information in collaborative working environments and how this may have an impact on job satisfaction.

7.1. *Research Limitations and future research*

As in all studies, the present research has some limitations that need to be mentioned. An initial limitation concerns the cross-sectional design of the study. As such, it was difficult to determine causal relationships among our constructs. Secondly, data were obtained from a single source, namely physicians. Therefore, the present design is likely to raise the possibility of common method bias. Although our model examined interaction effects which are less likely to suffer from common bias (Evans, 1985). However, common method variance may be overstated (Chan, 2009) and therefore (Spector, 2006), bias may still occur in this method. Moreover, given that this study focused on hospital doctors, we should be cautious about generalizing the present findings to other medical professionals.

Finally, some additional methodological concerns relate to the operationalization of some of our constructs. For example, OSR was measured using generic statements about physicians' use of online scientific databases and journals whereas personal barriers were measured using specific criteria (e.g. unfamiliarity with the use of a personal computer). As a result, different or more specific facets of both constructs could produce different results. In a similar methodological vein, the present study used the Michigan Organizational Assessment Questionnaire in order to assess physicians' job satisfaction. Although this scale is one of the most widely-used scales in the job satisfaction literature, other multi-dimensional scales could be used in future studies.

The value of this study lies in motivating scholars to shift their research focus on examining the purposes for which online information resources are typically used by physicians and on exploring the information related obstacles, which prohibit online information collection and usage. Future research may replicate our methodology to capture the impact of the utilization of online scholar resources on job satisfaction of medical professionals in general and reveal possible similarities or deviations from our findings. An additional promising avenue for further research would be to examine other intervening mechanisms that relate information needs to physicians' job satisfaction. In a related vein, the effect of other information needs such as work related needs could also be examined in relation to the present attitudinal outcome. Moreover, contrary to the existence of barriers in the present relationships, future research could address the moderating role of organisational factors that would facilitate the influence of doctors' information needs on both information utilization and job satisfaction.

8. Conclusions

The present study set out to extend prior theoretical and empirical research on some key informational facets of physicians' job related tasks. To this end, the relationship between information needs and information sources has been proposed as a predictor of job satisfaction. More specifically, we examined the effect of physicians' information needs on their job satisfaction via the use of online information scholarly resources. The results supported this indirect effect demonstrating that such needs affect the use of online information scholarly resources which consequentially has a positive effect on job satisfaction. In addition, we incorporated personal barriers as a moderator in this mediated effect, developing a moderated mediation model. Our research results support that information barriers are likely to hinder the positive relationship between information needs and the use of online information scholarly resources and therefore the indirect effect of the former on physicians' job satisfaction. The effect of information related barriers (which were explored in this study in the form of unfamiliarity with methods of information seeking and with the use of a personal computer, of lack of trust in digital information and of difficulty in understanding foreign language information) are particularly evident when considering the skills and resources required for utilizing efficiently OSR, i.e. online scientific databases and journals. The proliferation of health related databases, the advances in information retrieval technologies and the overload of medical information present a demanding challenge to physicians on the basis of identifying and organizing good quality and evidence-based health information. Addressing information related barriers and selecting good quality scholarly information sources are both important for the fulfillment of specific work-related information needs and for overall job satisfaction. For example, previous research highlights the importance of online health information literacy for doctors of all specialties as well as for medical students as a means of preparing them to be more proficient in various work role aspects and helping them practice evidence-based medicine (O'Carroll *et al.*, 2015). However, little is known on whether the continuous updating of information and digital literacy competencies, the accessibility and availability of information sources act as enablers in higher level work related objectives. This is particularly important, if we also consider that within a wider organizational context, previous research has found that job satisfaction is interrelated to other important work-related affective issues such as stress-

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3 coping, home-work balance and general well-being. These are presented as interesting
4 areas for further research on the basis of exploring the intersections between information
5 related constructs and organizational objectives.
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For Peer Review

Appendix – Research Instrument and Descriptive Statistics

A. Please indicate the level of importance assigned to the following medical practice information needs:

Medical Practice Information Needs	Importance (1= not a lot, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = a lot)	
	Mean	SD
Information for drugs	4.21	.98
Epidemiology	3.37	1.08
Patient information	2.96	1.23
Research ^δ	4.15	1.05
Teaching ^δ	3.78	1.39
α: p<0.05 gender; β: p<0.05 age; γ: p<0.05 specialty; δ: p<0.05 hierarchical level		

B. Please indicate the level of utilization of the following online scholar information resources:

Online Scholar Information Resources	Utilization (1= not a lot, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = a lot)	
	Mean	SD
Scientific online databases	4.66	.79
Online scientific journals	4.32	.96
α: p<0.05 gender; β: p<0.05 age; γ: p<0.05 specialty; δ: p<0.05 hierarchical level		

C. Please indicate the importance that you attribute in the following factors influencing your capability of seeking healthcare information online:

Barriers/obstacles to Online Information Seeking	Importance (1= a lot, 2 = a bit, 3 = moderately, 4 = a little, 5 = quite a bit)	
	Mean	SD
Unfamiliarity with methods of seeking information ^δ	1.80	1.05
Unfamiliarity with the use of personal computer	1.59	1.07
Lack of trust in digital information	1.85	1.07
Difficulty in understanding foreign language ^{β,γ}	1.70	1.10
α: p<0.05 gender; β: p<0.05 age; γ: p<0.05 specialty; δ: p<0.05 hierarchical level		

D. Please indicate the agreement of following statement concerning how you feel about your job:

Job Satisfaction	Agreement (1= a lot, 2 = a bit, 3 = moderately, 4 = a little, 5 = quite a bit)	
	Mean	SD
All in all, I am satisfied with my job	3.70	1.00
In general, I don't like my job	4.79	.60
In general, I like working here	3.52	1.03

Table 1: Sample profile

Variables	N (%)
<i>Gender</i>	
Male	76 (55.1)
Female	62 (44.9)
<i>Age (years)</i>	
<40	78 (56.5)
40-50	34 (24.6)
51-60	26 (18.8)
<i>Medical Specialty</i>	
Pathology	56 (40.6)
Surgery	54 (39.1)
Laboratory	28 (20.3)
<i>Employment hierarchical level</i>	
Professor/Associate Professor/Director	26 (18.8)
Assistant Professor/ Associate Clinical Director	46 (33.3)
Specialized doctor	66 (47.8)

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Table 2. Exploratory factor analysis with Varimax rotation.

	Component			
	1	2	3	4
Information for drugs	,09	,54	,06	,38
Epidemiology	,10	,80	-,07	,00
Patient information	,26	,69	,01	,03
Research	-,04	,70	,27	,15
Teaching	,01	,73	,19	,09
Scientific online databases	-,21	,20	,06	,81
Online scientific journals	-,03	,12	,21	,83
Unfamiliarity with methods of seeking information	,82	,14	,02	-,03
Unfamiliarity with the use of personal computer	,86	,09	,16	-,17
Lack of trust in digital information	,79	,15	-,17	,08
Difficulty in understanding foreign language	,75	-,02	-,10	-,10
All in all, I am satisfied with my job	-,09	,14	,86	
In general, I don't like my job	,04	-,03		

Table 3. Descriptive statistics, reliabilities and correlations.

	Mean	SD	1	2	3	4	5	6	7	8
1. Gender	1.45	.50								
2. Age	1.62	.79	-.12							
3. Employment sector	1.80	.76	.16	-.21*						
4. Employment level	2.29	.77	-.73**	.06	-.20*					
5. MPIN	3.70	.84	.12	.08	-.15	-.15	(.78)			
6. Use of OSR	4.49	.78	.12	.01	-.06	-.14	.27**	(.73)		
7. Job satisfaction	3.40	.70	.15	-.14	-.03	-.13	.21*	.36**	(.70)	
8. Information barriers	3.14	.89	-.02	-.10	.05	-.04	.15	.16	.02	(.70)

Reliability coefficients appear in parenthesis, * $p \leq .05$, ** $p \leq .01$

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Table 4. Mediation regression results.

Variables	Use of OSR	Job satisfaction
Control variables		
MPIN	.25**	.10
Use of OSR	-	.29**

* $p \leq .05$, ** $p \leq .01$

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6 **Table 5.** Moderated regression analysis.
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	Use of OSR
<i>Control variables</i>	
MPIN	.22**
Use of OSR	.14
MPIN * use of OSR	-.30**
Adjusted R²	.12**

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23 *p ≤ .05, **p ≤ .01
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49**Table 6.** Moderated mediation results for the indirect effect of MPIN on job satisfaction via the use of OSR across levels of personal barriers.

Moderator		Conditional indirect effect	Standard error	Z	P
	High	.14	.07	2.00	.04
Information barriers	Low	-.01	.04	-0.03	.76

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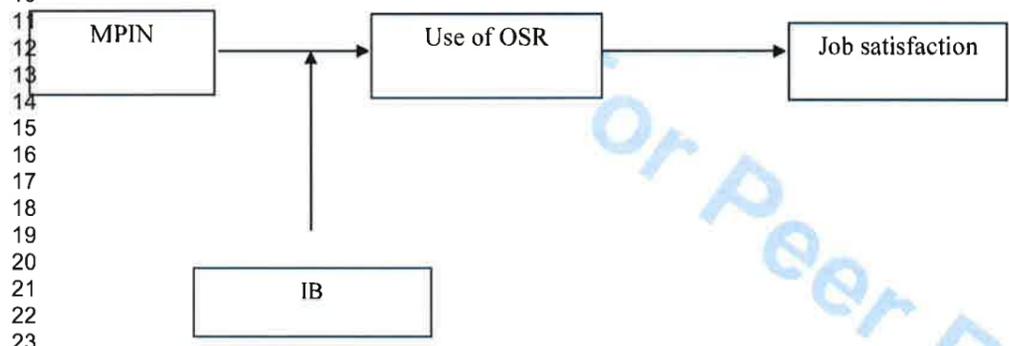


Figure 1. Hypothesized model.

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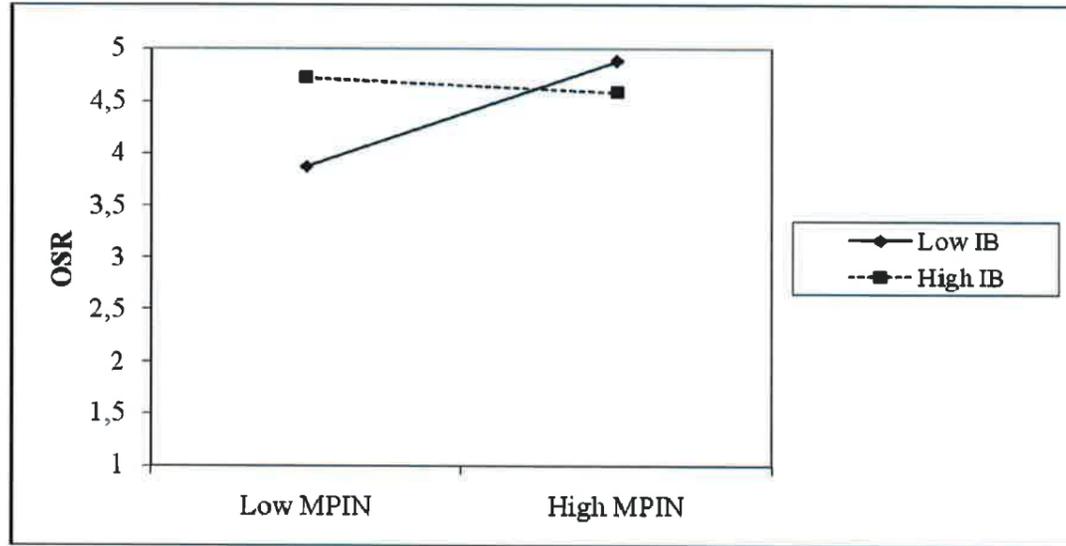


Figure 2. Interaction effects of MPIN and IB on the use of OSR.