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Psychological Conditions that Promote Job Engagement: Test of a Model

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According to Kahn's theoretical model (1990), the following three psychological conditions - meaningfulness, safety, and availability - are the key proximal predictors of job engagement. The current study examined the effects of these three psychological conditions (meaningfulness, safety, and availability) on three aspects of job engagement (JE), using both cross-sectional and daily diary data to examine between-person and within-person relationships among these variables. Psychological conditions were also examined as mediators of relationships between organizational and personal factors and job engagement. Furthermore, positive affect (PA) was tested as a moderator of the relationships between distal predictors and the three psychological conditions. A sample of 430 full-time U.S. employees, recruited from Amazon Mechanical Turk, completed baseline surveys; 307 of them completed more than three daily surveys in the following week. Main effects of meaningfulness and availability on physical, cognitive, and emotional JE were significant and positive at both general- and day-level. Safety was only significantly and positively related to emotional JE at general- and day-level. The effects of the three psychological conditions were non-compensatory. Moreover, meaningfulness mediated the effects of

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skill variety, task significance, work-role fit, supervisor support, and coworker support on all three aspects of JE. Availability mediated the effects of FWC, self-efficacy, and autonomy on all three aspects of JE. PA was demonstrated to be positively associated with all three psychological conditions and JE, and it moderated the supervisor support-availability and coworker support-safety relationships, such that these positive relationships were stronger when PA was low.

Keywords: job engagement, meaningfulness, availability, safety, positive affect

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Introduction

Job engagement has received much attention from both academic researchers and business practitioners in the past decade. This is due to intensive global competition and the need for organizations to better utilize human resources to achieve successes. A recent study found that disengaged employees were less productive than engaged employees and cost the economy approximately 300 billion per year (Gallup, 2005). Job engagement has also been associated with other organizational outcomes, such as job performance, organizational citizenship behaviors, affective commitment, turnover, safety behaviors, and customer services (Christian, Garza, & Slaughter, 2011; Fleming & Asplund, 2007; May, Gilson, Harter, 2004; Rich, LePine, & Crawford, 2010; Richman, 2006; Saks, 2006; Shuck, Reio, & Rocco, 2011;Wachter & Yorio, 2014). Although job engagement is connected to a wide variety of organization benefits, it has been reported that less than 30% of the global workforce is engaged (Gebauer & Lowman, 2008). Therefore job engagement becomes a prominent challenge for human resource researchers and practitioners. Not surprisingly, there has been great interest from practitioners in sources of job engagement. For example, the Gallup Workplace Audit assesses many potential organizational factors that may influence employee job engagement. However, there are relatively few studies on sources of job engagement in the academic literature (Rich, LePine, & Crawford, 2010; Robinson, Perryman, & Hayday, 2004).   Specifically, there is a dearth of research examining antecedents of

job engagement and testing theories and mechanisms that may explain the connections between the antecedents and job engagement.

To address this knowledge gap, the current study attempts to: (i) examine organizational and personal factors that serve as antecedents of job engagement; (ii) test the three psychological conditions of meaningfulness, safety, and availability proposed by Kahn as mediating mechanisms between the antecedents and job engagement; (iii) explore how personal differences may affect employees' perceptions of the three psychological conditions, i.e. the moderating effects of individual difference on the relationships between situational antecedents and the three psychological conditions; (iv) test whether the effects of meaningfulness, safety and availability on job engagement are compensatory.

Kahn (1990), regarded as the first to apply engagement theory to the workplace, defined job engagement as "the harnessing of organization members' selves to their work roles" and disengagement as "the uncoupling of selves from work roles" (p. 694). Personal engagement is further described as the employing and expressing of oneself physically, cognitively, and emotionally during work role performances. In other words, job engagement involves investing the "hands, head, and heart" (Ashforth & Humphrey, 1995: 110). An engaged employee is physically involved, cognitively vigilant, and emotionally connected. Conversely, a disengaged employee uncouples and withdraws from the work role physically, cognitively, and emotionally. Based on Kahn's conceptualization, Rich (2006) further defined physical engagement as the exertion of

effort in one's job, cognitive engagement as the investment of cognitive labor such as attention and absorption, and emotional engagement as the infusion of emotions into one's work. The three sub-dimensions serve as indicators of the higher-order latent job engagement construct.

Kahn (1990) used the qualitative data of his ethnographic interview with summer camp counselors and architecture firm employees to identify three important psychological conditions that directly determined job engagement: meaningfulness, psychological safety, and psychological availability. Meaningfulness refers to the feeling of receiving returns from the investment of one's physical, cognitive, and emotional energy. Psychological safety refers to feeling able to express oneself without fear of negative consequences to self-image, status, and career. Psychological availability refers to the sense of having physical, cognitive, and emotional resources to engage. Thus, Kahn provided an initial theoretical framework to understand contextual factors and individual characteristics that foster employees' willingness to engage in their job through psychological conditions.

However, only a few empirical studies have tested Kahn's engagement theory. This may be due to the underdevelopment of a valid job engagement measure operationalizing Kahn's conceptualization. Grounded in Kahn's theoretical framework, Rich, LePine, and Crawford (2010) found value congruence, perceived organizational support, and core self-evaluations were significantly related to job engagement, but they did not examine the mediating effects of the three psychological conditions. May,

Gilson, and Harter (2004) were the first to test Kahn's engagement model, including a

test of the proposed mediations linking job design characteristics to job engagement.

Results of their study confirmed that the connections between job enrichment and work

role fit with engagement were both fully mediated by psychological meaningfulness,

and the association between adherence to co-worker norms and engagement was

partially mediated by psychological safety. Olivier and Rothmann (2007) found that

meaningfulness mediated the relationship between co-worker relations and work role

fit with work engagement, and psychological availability mediated the relationship

between resources and work engagement. Taken together, these previous studies

provide initial support of Kahn's job engagement model. Nevertheless, there are some

important methodological issues and limitations in these studies. Furthermore, some

interesting research questions regarding job engagement have not been addressed.

First, all the previous research used cross-sectional design, which assumes the

stability of job engagement over time. This contradicted Kahn's (1990) notion that

people respond to the ebbs and flows of daily life, constantly bringing in and drawing

back varying degrees of their selves during their work days. Sonnentag et al. (2010)

also pointed out job engagement can vary within person from day to day, in response to

specific contextual and personal conditions. In real life, it is common that a highly

engaged employee may still have an off-day. Moreover, empirical research has shown

more than 40% of the total variance of job engagement is attributed to within-person

fluctuations (Bakker & Bal, 2010; Xanthopoulou & Bakker, 2012). Therefore, a

research design that captures the momentary fluctuations of job engagement is more appropriate for testing the model and to identify factors that determine those important moments when employees are willing to engage themselves.

Second, previous research has not yet examined individual differences in people's psychological perceptions of work situations. Employees' dispositions may yield different interpretations and appraisals of the same contextual factors. For example, one employee may be more engaged in his or her work after receiving negative feedback from customers because he or she regards it as a challenge. The employee perceives meaningfulness because the job provides an opportunity to improve interpersonal skills. Whereas another employee may react to the same kind of negative feedback in job disengagement because this person perceives lower psychological safety, since the negative comments reduce his or her self-image. Therefore, it is important to incorporate individual differences in Kahn's theoretical framework of job engagement and to examine the moderating effects of individual differences on the relationships between organizational and personal factors and the three psychological conditions that are proposed to mediate job engagement. An initial candidate for a personal dispositional factor that may be particularly relevant is positive affectivity (PA), which is known to affect reactions to a wide variety of phenomena.

Third, previous research has not yet explored potential interactions among the three psychological conditions. According to Kahn (1990), a primary aim of future studies should be to explore how the three psychological conditions combine to

promote employees' job engagement or disengagement. There are various combination

models. It is possible the effects of the three psychological conditions on job

engagement are additive and compensatory: a high level of one condition may

compensate for the low level of another. Also, the compensatory effect may involve a

specific hierarchy. For example, strong meaningfulness can compensate for weak safety,

but employees may not be engaged when they do not perceive meaningfulness of their

job no matter how high their perception of safety is. It is also possible that the effects of

the three conditions are non-compensatory: employees are engaged only when each

condition is higher than certain threshold level. Hence, testing how the three

psychological conditions interplay with each other will shed brighter lights on the

process by which job engagement is created.

Last but not least, additional research is needed to help us better understand job

engagement by differentiating the physical, cognitive, and emotional dimensions of job

engagement. As Kahn (1990) noted, there might be a hierarchy among the three

dimensions. An employee may first invest him or herself physically, then cognitively,

and finally emotionally. This is consistent with Kelman's (1958) argument that the

highest investment of oneself into role performance is the infusion of emotions and

only at this level this person is fully present in his or her job. It is likely that some

antecedents are more closely connected to certain dimension of job engagement.

Therefore, examining how the distal antecedents and the proximal three psychological

conditions relate to physical, cognitive, and emotional dimensions differently will offer

a richer portrait of job engagement.

To address these issues and shed light on the research questions identified above, the current study was conducted, using a daily diary methodology. I tested Kahn's engagement model using a combined daily diary approach and cross-sectional approach. In addition to testing the model in a more methodologically appropriate way, I expanded the model to include a proposed moderating effect of PA in the relationships between distal antecedents and the proximal conditions of meaningfulness, safety, and availability. I also explored how the three psychological conditions interact with each other.   Further, to represent the multidimensional nature of the job engagement construct, I tested the models based on the sub-dimensions of physical, cognitive, and emotional engagement.

Differentiation of physical, cognitive, and emotional engagement

Kahn (1990) and Kelman (1958) suggest there may be a hierarchy of the three engagement dimensions. The lowest level of engagement would be solely physical, robotic, automatic, and lack of cognitive and emotional involvement. And the highest level of engagement must involve the emotional elements. Although Kahn (1990) did not explicitly posit that some distal antecedents or mediating psychological conditions should be more closely related to certain dimension of job engagement, he clearly recommended that future studies should explore the potential different patterns of relationships between the three dimensions of job engagement and their correlates. To better understand the distinction of the three dimensions and their presumed hierarchy,

the current study psychometrically differentiated the three engagement dimensions in measurement and data analyses.

Theoretical Framework: Psychological Mechanisms Contributing to Job Engagement

Kahn (1990) argued that employees engage or disengage in their job based on their psychological experience of their work contexts and their own individual characteristics. Through in-depth interviews, Kahn identified three direct psychological conditions that determine job engagement: meaningfulness, safety, and availability. Prior to choosing to be engaged or disengaged, employees seem to unconsciously ask three questions: (1) How meaningful is it for me to bring myself into this performance? (2) How safe is it to do so? and (3) How available am I to do so? Employees employ and express varying levels of selves into their job based on their answers to these three questions. In other words, these three psychological conditions serve as mediators through which the organizational and personal factors lead to job engagement.

Psychological meaningfulness has long been recognized as an important factor in the workplace (Hackman & Oldham, 1980). When employees feel their work is meaningful, they are most likely to be engaged. On the contrary, lack of meaningfulness of ones' work will result in alienation from one's work and cynicism (Cartwright & Holmes, 2006). As Frankl (1984, p. 105) noted "Man's search for meaning is the primary motivation in his life."

Psychological safety, serving as guarantees, ensures employees that there will be

no negative consequences of their truly expressing themselves in their job (Kahn, 1990). In a threatening and untrustworthy environment, employees are more likely to hide and alienate their true selves from their work.

Employees who are psychologically available should be more willing and ready to invest their physical, cognitive, and emotional resources into their work roles. Employees who experience less psychological availability should bring in lower levels of selves into work because they believe their physical, cognitive, or emotional energy is not sufficient.

There is some previous empirical research that provides support for Kahn's theorized relationships between the three psychological conditions and job engagement at the between-persons level. As noted earlier, May, Gilson, and Harter (2004) found meaningfulness and safety were positively and significantly connected to job engagement. In their study, which used structural equation modeling to examine data from a cross-sectional survey study, they reported with standardized coefficients of 0.73 and 0.17 for meaningfulness and safety, respectively. In another cross-sectional study, Olivier and Rothmann (2007) demonstrated that the three psychological conditions were significant predictors of job engagement, with meaningfulness being the strongest predictor. In their studies, job engagement was treated as one general factor, not differentiated among its three dimensions.

The specific concern of Kahn's (1990) job engagement model was the moments in which employees engage or remove themselves from work. Consistent with Kahn's

argument, empirical research has shown that a substantial portion of the total variance of job engagement is attributed to within-person fluctuations (Bakker & Bal, 2010; Xanthopoulou & Bakker, 2012). Kahn believed that employees are constantly increasing and decreasing their level of involvement in their work in response to momentary psychological experience of work. He also pointed out that it is momentary psychological conditions rather than static circumstances that primarily shape people's engagement behaviors. This indicates that connections between psychological conditions and job engagement should also occur at the within-person level. However, previous studies testing Kahn's model only focused on how the static organizational or personal factors affected employees' job engagement at the between-person level. To better examine Kahn's theoretical model, the current study tested the relationships between the three psychological conditions and job engagement (physical, cognitive, and emotional) at within-person level as well as the between-person-level. Therefore, the following hypotheses were proposed:

Hypothesis 1a: Psychological meaningfulness is positively related to job engagement (both between-person and within-person level).

Hypothesis 1b: Psychological safety is positively related to job engagement (both between-person and within-person level).

Hypothesis 1c: Psychological availability is positively related to job engagement (both between-person and within-person level).

Antecedents of Psychological meaningfulness

Psychological meaningfulness refers to perceived benefits of investing oneself into the work role. According to Kahn (1990), employees perceive their work roles as meaningful when they feel useful, worthwhile, and valuable, and employees perceive lack of meaningfulness when they feel there is little room for them to give and receive in their work roles.

Psychological meaningfulness is impacted by job characteristics. Employees experience more meaningfulness when they are doing work that provides challenges and variety, allows for autonomy and creativity, and gives clear delineation of procedures and goals (Kahn, 1990). This argument is consistent with Hackman and Oldham's (1980) job characteristics model: important psychological states such as meaningfulness affect peoples' internal work motivation and attitudes. Macey and Schneider (2008) also argued that some features of work are intrinsically motivating and thus influence how people are willing to invest their resources into work. In a recent meta-analysis study, task significance and skill variety, which the job characteristics model posits as characteristics that produce the psychological experience of job meaningfulness, were found to be significantly connected to job engagement (Christian, Garza, & Slaughter, 2011). Empirical studies also found job/task characteristics and job enrichment are significantly associated with meaningfulness and job engagement (May, Gilson, & Harter, 2004; Saks, 2006). In addition, job characteristics are relatively stable aspects of the work environment (Saavedra & Kwun, 2000) and are less likely to fluctuate on a momentary or daily basis.

This indicates that employees' perception of meaningfulness, as produced by their job characteristics, is also stable. Thus the association between job characteristics and meaningfulness should occur mostly at the between-person level.

Psychological meaningfulness can also be achieved through the perceived fit between the role identities required by the work and one's preferred self-image. When organizations ask for behaviors that are congruent with what is valued as a part of employees' self-images, they will feel the work roles as inviting and valuable enough to enable them engaged in the work roles. Conversely, if the work requires behaviors incongruent with one's values, employees tend to distance themselves from their work (Kahn, 1992; Rich, Lepine, & Crawford, 2010). Work-role fit provides people with meaningfulness because it satisfies their needs for belongingness and relatedness. When employees' work identities match their preferred self-image, they are able to express their opinions, values and principles openly (Kahn, 1990; May et al., 2004). Previous studies have demonstrated that work role fit influences how employees experience meaningfulness of their work and invest more personal resources in the pursuit of organizational goals (Brown & Leigh, 1996; May, Gilson, & Harter, 2004; Rich, Lepine, & Crawford, 2010; Olivier and Rothmann, 2007). Moreover, a recent study in South Africa demonstrated that work-role fit had a significant positive impact on perceived meaningfulness, and meaningfulness significantly mediated the relationship between work-role fit and job engagement (Van Zyl, Deacon, & Rothmann, 2010). In addition, researchers have found that the work role fit is generally

stable over time (DeRue & Morgeson, 2007). Therefore, the impact of work-role fit on meaningfulness should primarily be a between-person phenomenon. Thus, the relationship between work-role fit and meaningfulness should be investigated at the between-person level.

Hypothesis 2a: Job characteristics are positively related to psychological meaningfulness.

Hypothesis 2b: Work role fit is positively related to psychological meaningfulness.

Empirical studies have provided initial support for the mediating effects of meaningfulness on the relationships between job enrichment (i.e. job characteristics that are hypothesized by the job characteristics model to be experienced in terms of work meaningfulness), work-role fit and job engagement (May, Gilson, & Harter, 2004; Van Zyl, Deacon, & Rothmann, 2010). Consistent with Kahn's theorizing about the mediating mechanism of meaningfulness by which contextual factors impact job engagement and aforementioned reasoning of why job characteristics and work-role fit may influence people's perception of meaningfulness, I propose that meaningfulness mediates the relationships of job characteristics and work-role fit with job engagement.

Hypothesis 3a: Psychological meaningfulness mediates the relationship between job characteristics and job engagement.

Hypothesis 3b: Psychological meaningfulness mediates the relationship between

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work role fit and job engagement.

Antecedents of Psychological Safety

Psychological safety refers to investing oneself into work without fear of negative consequences. Employees perceive safety in situations that are nonthreatening, trustworthy, predictable of potential consequences of behaviors, and clear about boundaries between what is allowed and disallowed.

Kahn (1990) suggests that supportive and trusting interpersonal relationships in workplace may promote psychological safety. Such supportive and trusting environments allow employees to take risks, express their real selves, try and fail without fearing the consequences. The support, caring and concerns employees receive from their supervisors and coworkers assure them that their engagement in work will not result in negative consequences damaging their self-image, status, or career (Rich, 2010). Kahn and Heaphy (2014) further pointed out that voice and expression of oneself is an import aspect of job engagement. Job engagement involves expressing concerns or conflicting views and giving voice to difficult experiences and conversations. Engaged employees openly and freely express rather than withdraw them from view. Such self-expression and voice implies vulnerability and exposure. Supportive interpersonal relationships can improve employees' engagement because employees are ensured it is safe to express their true selves. This is consistent with the empirical findings that positive supervisor and coworker relations foster safety (May, Gilson, & Harter, 2004; Olivier and Rothmann, 2007), and perceived organizational

support increases job engagement (Bakker, Demerouti, & Schaufeli, 2005; Nembhard & Edmondson, 2006; Rich, Lepine, & Crawford, 2010; Saks, 2006; Xanthopoulou, et al, 2008).

Furthermore, supervisor and coworker support are likely to fluctuate on a daily basis. For example, Simbula (2010) found 42% of the variance of social support from colleagues was attributed to the within-person fluctuation on a daily basis in a sample of teachers. The connection between social support and perceived safety thus may also occur at the within-person level. Testing this relationship at the within-person level better captures Kahn's focus on peoples' momentary varying experiences of work. On the other hand, the between-person variance of social support is also well documented. Testing this relationship at the between-person level provides a whole picture of how social support influences safety and provides the opportunity to compare results with other cross-sectional studies. Therefore, the current study proposes to test the following hypotheses:

Hypothesis 4a: Supervisor support is positively related to psychological safety (both between-person and within-person (day-) level).

Hypothesis 4b: Coworker support is positively related to psychological safety (both between-person and within-person (day-) level).

Empirical study provided initial support for the mediating effect of safety on the relationship between coworker norms and job engagement (May, Gilson, & Harter, 2004). Consistent with Kahn's theorizing that safety is a mediating psychological

condition that connects interpersonal contexts with job engagement especially

speaking out and giving voices, and the previous reasoning of how supportive

interpersonal may impact employees' perceived safety, I proposed the following

hypotheses:

Hypothesis 5a: Psychological safety mediates the relationship between

supervisor support and job engagement (both between-person and within-person (day-)

level).

Hypothesis 5b: Psychological safety mediates the relationship between

coworker support and job engagement (both between-person and within-person (day)

day- level).

Antecedents of Psychological availability

Psychological availability refers to feeling one possesses enough physical,

cognitive, and emotional resources to invest in one's job. Psychological availability

captures people's readiness to invest their selves into work. Lack of resources will

disenable people to take the physical labor, think clearly, and express the expected

emotions at work (Kahn, 1990; May, Gilson, & Harter, 2004). According to its

definition, availability should be impacted by factors that may distract or preoccupy

one's resources and also factors that may increase, enhance, or enrich one's resources,

Kahn (1990) has pointed out one resource distracting factor- self- consciousness.

Self-consciousness, which means employees focus on how other people judge and

perceive them, is assumed to have a negative impact on psychological availability.

Self-consciousness plays an important role in self-regulation .Employees with high

levels of self-consciousness tend to view themselves as social objects, and adjust and

organize behaviors on the basis of perceived or projected external expectations from

other people (Plant & Ryan, 1985). Also, empirical study has found

self-consciousness was highly related to self-monitoring (Turner, Carver, Scheier, &

Ickes, 1978). Such regulating and monitoring processes take one's resources and

energies. Thus employees with high levels of self-consciousness are less engaged

because they are preoccupied in the work of impression management and do not have

enough resources to invest in their work tasks. Self-consciousness is a stable personal

factor and thus its effect on perceived availability should occur at the between-person

level.

Another resource distracting factor is family-to-work conflict (FWC). If

employees are preoccupied with family issues and demands, they do not have

sufficient resources or energies to psychologically engage in their job. May, Gilson,

and Harter (2004) have documented the negative relationship between outside work

activities and psychological availability. Family demands, as a prominent domain of

people's lives outside the work environment, is a key source of outside work

distractions that should interfere with psychological availability. Previous research also

showed that there was a negative correlation between FWC and job engagement for

both male and female (Eftakhar & Bavi, 2013). Moreover, a recently study found

employees with high levels of FWC had lower levels of absorption in their job than

employees with low levels of FWC (Dåderman & Basinska, 2016). Gignac, Kelloway, and Gottlieb, (1996) found a significant relationship between FWC and work withdrawal behaviors. Many previous studies have documented the daily fluctuation of family work conflict (e.g. Butler et al, 2005; Nohe, Michel, & Sonntag, 2014), so the influence of FWC on employees' perception of availability may also occur at the within-person level from day to day. Investigating the relationship between FWC and availability at the within-person level provides help to understand Kahn's key proposition that the varying degrees of outside work activities may influence peoples' momentary psychological condition, and in turn result in varying degrees of job engagement.

On the other hand, one resource increasing factor is self-efficacy. Self-efficacy, defined as the confidence and beliefs in one's ability to achieve set goals, has been regarded as the central dimension of psychological resources (Bakker, et al., 2008; Luthans et al., 2006). People with low levels of self-efficacy tend to scan the environment for potential dangers, appraise demands as threatening, and cope with problems in maladaptive way (Jerusalem & Schwarzer, 1992). The perceptions of threat and loss in distressful situations come up faster and to a higher degree for low self-efficacious people than high self-efficacious people. Therefore self-efficacy is a resource factor with respect to stress. For example, self-efficacy has been documented by many empirical studies to be negatively related to stress, exhaustion, and burnout (Brouwers & Tomic, 2000; Schwarzer & Hallum, 2008; Shoji, et al, 2016). Moreover,

self-efficacy also makes a contribution to motivation because highly self-efficacious people believe they are able to perform the necessary behaviors to succeed (Stajkovic & Luthans, 1979). Thus highly self-efficacious people tend to make efforts and engage in their work. Empirical research showed that self-efficacy had a positive effect on job engagement (Xanthopoulou, et al, 2008). Studies also demonstrated that self-efficacy is associated with learning new knowledge and skills and achieving high job performance (Caprara, et al, 2008; Judge & Bono, 2001). Therefore, self-efficacy should have a positive effect on perceived availability because self-efficacy maintains employees' health in stressful environments and creates and transfers new resources through learning and achievement. Since self-efficacy is a stable general belief in oneself, its connection with availability should also occur at the between-person level. Therefore I proposed the following hypotheses:

Hypothesis 6a: Self-consciousness is negatively related to psychological availability.

Hypothesis 6b: FWC is negatively related to psychological availability (both between-person and within-person (day -) level).

Hypothesis 6c: Self-efficacy is positively related to psychological availability.

Consistent with Kahn's theorizing of psychological availability as a mechanism that promotes job engagement, and the previous reasoning on why self-consciousness, FWC and self-efficacy may have an impact on perceived availability, psychological availability should mediate relationships of these three factors with job engagement.

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Hypothesis 7a: Psychological availability mediates the relationship between self-consciousness and job engagement.

Hypothesis 7b: Psychological availability mediates the relationship between family-work conflict and job engagement (both between-person and within-person (day-) level).

Hypothesis 7c: Psychological availability mediates the relationship between self-efficacy and job engagement.

Trait Positive affect (PA)

Kahn's (1990) theoretical framework of job engagement focuses on people's perceptions of the work situations. As he noted, individual differences may also shape people's disposition, willingness, and ability to be engaged in their work roles. However, research to date has not yet incorporated and tested such individual differences as part of the job engagement model. The current study incorporates Kahn's suggestion by considering a personality factor that appears to be relevant to their psychological interpretations of the work environment as they pertain to the three psychological mechanisms in the job engagement model.

The focal personality factor that I propose is trait positive affect (PA). PA refers to the enduring disposition and tendency to experience situations and circumstances in a positive way. In a broadened framework of employee engagement, Macey and Schneider (2008) identified PA as trait engagement. And they argued that PA descriptors such as attentive, alert, enthusiastic, inspired, proud, determined, strong,

and active connote high levels of activation, which define an engaged person (energetic and enthusiastic). Meta-analysis research also found that PA was strongly related to job engagement (Christian, Garza, & Slaughter, 2011). Therefore, employees with high levels of PA are more likely to be engaged in their job.

Moreover, PA may influence job engagement through employees' perception of meaningfulness, safety, and availability. According to the cognitive appraisal theory (Lazarus & Folkman, 1984), emotions play an important role in people's appraisal of situations and events. Positive feelings and emotions lead to positive evaluation of the situations as opportunities and challenges; and negative feelings and emotions result in negative appraisal of the situations as threats and danger. High PA people are inclined to feel pleasant, happy, excited, and enthusiastic, and thus their appraisal of work situations tends to be in a positive way: easily sensing the value and importance or work, feeling low or none threats and danger in work environment, and believing oneself in possession of enough resources to deal with work challenges. In other words, employees with high levels of PA generally experience high levels of meaningfulness, safety and availability. In support, empirical study has shown that PA was a strong and consistent predictor of one's perception of meaning in life, and priming positive mood enhanced peoples' perception of meaning (King, et al, 2006). Moreover, PA leads to good physical and mental health, which are crucial as personal resources. For example, research has found that PA was connected to resilience to adversity and psychological growth (Fredrickson, Tugade, Waugh, & Larkin, 2003),

and PA reduced biological responses to stress and resulted in lower levels of cortisol

(Steptoe, Wardle, & Marmot, 2005).   Therefore I proposed the following hypotheses:

Hypothesis 8a: PA is positively related to the three psychological conditions.

Hypothesis 8b: PA is positively related to job engagement.

The moderating effect of PA on the relationship between the proposed distal

predictors and the three psychological conditions also lies in the influence of PA on

peoples' cognitive appraisal processes. More specifically, research has shown that

people sometimes use their mood and emotions as the source of information when

making judgements and appraisals (Schwarz, 2013). Instead of evaluating all the

relevant information, people sometimes interpret their feelings and emotions as being

relevant to the evaluation target and this subconscious process saves cognitive efforts.

Moreover, this "feelings-as-information" heuristic approach is more likely to be used

by people in a positive mood than a negative mood (Schwarz & Clore, 1996). Because

of the consistent favorable feelings and emotions, people with high levels of PA hold a

favorable appraisal of their work situations-high meaningfulness, safety, and

availability. Even faced with low-levels of organizational or personal drivers, high PA

people still evaluate their psychological conditions favorably because the good

feelings and emotions are subconsciously regarded as information to make appraisal

and mask the influence of low levels of the other organizational and personal drivers.

Thus the positive psychological conditions (meaningfulness, safety, and availability)

do not increase greatly from low levels of the antecedents to high levels of

antecedents for high PA people because they generally perceive high degrees of the

positive psychological conditions. However, when low PA people are faced with

organizational or personal factors, their feelings and mood do not have a favorable

input in the situation evaluation and the effects of the antecedents on psychological

conditions become salient.   Thus, low PA employees' perceived meaningfulness,

safety and availability increase greatly in response to the increase of the personal or

organizational impetuses. In other words, the proposed relationships between distal

organizational and personal factors and the three psychological conditions are

stronger for employees with low levels of PA. So I proposed the following hypothesis:

Hypothesis 9: PA moderates the relationships between the distal antecedents

and the three psychological conditions, such that the relationships are stronger for

employees with low levels of PA.

The full hypothesized model is shown in Figure 1.

Research question: interactions of psychological conditions

As Kahn (1990) pointed out, one important research question still remains: how

do the three psychological conditions combine to produce job engagement? Do they

have any interactive effects? Are the three psychological conditions all necessary for

job engagement? Can employees still engage in work if they perceive high

meaningfulness even though they also feel threats in the environment? Although there

is not a strong basis for hypothesizing the nature of any such interactive effects,

exploratory work on this issue can inform additional thinking about the topic. As a first

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step, this study will begin by asking whether the three psychological conditions interact in a compensatory fashion to explain variance in job engagement.

Research question: Do psychological meaningfulness, safety, and availability interact in a compensatory fashion to explain variance in job engagement?

Method

Procedure

Participants were recruited via Amazon's Mechanical Turk (MTurk). Screening surveys were created inviting people (US only and with a 95% task approval rate) to participate. Those who completed the screening survey, regardless of whether they were eligible to participate, received 10 cents. Only participants who worked full time (e.g., 35 or more hours/week), had interactions with supervisor and coworkers to some extent, and resided in the U.S. were invited to complete the baseline survey. Participants were also checked to make sure they paid attention when filling out the baseline survey. Answers to the attention check question "One plus eight is ten." were examined. Participants were paid $2.50 for successfully completing the baseline survey and further invited to complete a series of daily surveys during week 2. The screening and baseline surveys were all done on Monday or Tuesday in week 1.

From the Monday in week 2, participants began filling out once-daily surveys. Participants were asked to take the daily survey upon arriving home from work each day during the work week (for 1 consecutive week, 5 days in total). Considering the

potential intrusiveness of a daily diary design, participants were compensated $0.80 for each survey, plus a bonus of $5.00 for completing all 5 daily diary surveys. Participants received the initial email to the daily survey at approximately 6pm during daily diary survey collection. Participants received one reminder email at approximately 8pm if they had yet to fill out the daily diary survey during a given day.

Sample

A total of 655 people took the screening survey and 479 met the inclusion criteria. Of the 479 who met the inclusion criteria, 455 completed the baseline survey. However, 25 participants were excluded from the study because they did not pay sufficient attention (i.e. they did not correctly respond to the attention check question in the survey). The remaining 430 participants were invited to complete the daily surveys. Of the 430 who met the study inclusion and attention criteria and completed the baseline survey, 81 of them elected not to participate in the daily survey phase. Of those who completed at least one daily survey, 22 of them completed one daily survey, 20 of them completed two daily surveys, 16 of them complete three daily surveys, 16 of them completed four daily surveys, and 275 of them completed all five daily surveys.

For the 430 people who successfully completed the baseline survey, age ranges from 19 to 70, mean age = 36.21, SD = 10.02. 53% of them were male, 47% were female. 14% of them had income of less than $25,000/year, 34% had income of $25,000 to $49,999/year, 34% had income of $50,000 to $ 74,999/year, 13% had income of $75,000 to $99,999/year, and 6% had income more than $100,000/year. 30%

of them had below college degree, 54% had college degree, and 16% had graduate

degree. The sample were employed in a variety of industries, including: accounting,

administration, banking, computer science, consulting, customer service, ecommerce,

education, engineering, entertainment, finance, government, health care, insurance, IT,

legal service, manufacturing, marketing, medicine, non-profit service, real-estate,

restaurant, and sales.

Measures

The items comprising all measures are included in the Appendix.

Baseline Survey (between person variables).

Demographic variables. Participants were asked about their age, gender,

education level, income level, and job industry.

The remaining variables, described below, were assessed on 5-point Likert-type

response scales, from 1 = strongly disagree to 5 = strongly agree. The stem of each item

began with "In general, I feel…"

Psychological meaningfulness. Psychological meaningfulness (MF) was

measured by three items developed from Spreitzer (1995) and May (2003). One sample

question is "The work I do on this job is worthwhile." Internal consistency reliability

for the 3-item scale was α = .93 for the sample who completed the baseline survey.

Psychological safety. Psychological safety (SF) was measured by three items

developed by May, Gilson, & Harter (2004). One sample question is "I'm not afraid to

be myself at work." Internal consistency of the 3-item scale was α = .66.

Psychological availability. Psychological availability (AV) was measured by three items developed by May, Gilson, & Harter (2004). One sample question is "I am confident in my ability to think clearly at work." Internal consistency of the 3-item scale was $\alpha = .83$.

Job engagement. Job engagement (JE) was assessed by the scale developed by Rich (2006). It included three subscales to represent the three dimensions of job engagement proposed by Kahn. Physical engagement (PJE) had three items; one example is "I devote a lot of energy to my job." Internal consistency coefficient $\alpha = .84$. Cognitive engagement (CJE) had three items; one example is "At work, I pay a lot of attention to my job." Internal consistency coefficient $\alpha = .90$. Emotional engagement (EJE) had three items; one example was "I am excited about my job." Internal consistency coefficient $\alpha = .93$.

Job Characteristics. Job characteristics (JC) was measured by nine items from the revised Job Diagnostic Survey (Hackman & Oldham, 1980; Idaszak, & Drasgow, 1987) regarding three core job characteristics that contribute to the motivating potential of a job: skill variety, task significance, and autonomy. For skill variety (SV), there were three items; one example is "The job requires me to use a number of complex or high-level skills." Internal consistency coefficient $\alpha = .78$. For task significance (TS), there were three items; one example is "This job is one in which a lot of people can be affected by how well the work gets done." Internal consistency coefficient $\alpha = .81$. For

autonomy (AT), there were three items; one example is "My job permits me to decide on my own how to go about doing my work." Internal consistency coefficient $\alpha = .84$.

Work role fit. Work role fit (WRFit) was assessed by three items developed by May, Gilson, & Harter (2004) regarding the perceived fit between one's job and self-concept. One sample item is "My job fits how I see myself." Internal consistency coefficient $\alpha = .94$.

Supervisor support. Supervisor support (SS) was assessed by three items developed by Peeters, Buunk, and Schaufeli (1995). One example item is "My supervisor showed that he or she appreciated the way I do my work." Internal consistency coefficient $\alpha = .85$.

Coworker support. Coworker support (CS) was measured by the same three items used to measure supervisor support, but the support source was modified to refer to coworkers (internal consistency coefficient $\alpha = .81$).

Family-to-Work Conflict. Family-to-work conflict (FWC) was assessed by four items developed from Carlson and Frone (2003). One sample item is "Family demands make it difficult for me to have the work schedule I want." Internal consistency coefficient $\alpha = .86$.

Self-consciousness. Self-consciousness (SCon) was measured by three items developed by Fenigstein et al (1975). One sample item is "I worry about how others perceive me at work." Internal consistency coefficient $\alpha = .88$.

Self-efficacy. Self-efficacy (SE) was measured by three items developed by Chen and Eden (2001). One sample item is "I believe I can succeed at most any endeavor to which I set my mind." Internal consistency coefficient α = .90.

Positive Affect. Trait positive affect (PA) was assessed by eight items from the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). Participants was asked to rate to what extent they generally felt each of the eight positive affect adjectives. One example is "excited" (internal consistency coefficient α = .90).

Daily Survey (within person variables).

The daily survey instructed participants to answer the questions based on the current day. At the first page of the survey, the instruction said "Please fill out this survey based on what happened TODAY"; and also in each question instruction, "Today" was emphasized in bold font and underlined.

Variables in the daily survey were measured using the same scales as described for the baseline survey, with the instruction to answer based on the current day's experience.

Internal consistency estimates for the daily variables were based on the 307 people who completed at least three daily surveys because the within-person analyses were based on this sample. It is recommended that daily diary study should exclude participants who did not provide enough data points to get sufficient within-person variances, and it is a common criterion for empirical research to retain participants

who complete at least half of the total daily surveys (Torres & Ong, 2010; Totenhagen, Serido, Curran, & Butler, 2012).

Psychological meaningfulness. Internal consistency estimates for daily MF were α = .94, .94, .94, .94, and .93 for Monday to Friday, respectively.

Psychological safety. Internal consistency estimates for daily SF were α = .60, .62, .60, .64, and .72 for Monday to Friday respectively.

Psychological availability. Internal consistency estimates for daily AV were α = .82, .84, .85, .75, and .85 for Monday to Friday respectively.

Physical engagement. Internal consistency estimates for daily PJE were α = .86, .90, .92, .91, and .90 for Monday to Friday respectively.

Cognitive engagement. Internal consistency estimates for daily CJE were α = .92, .91, .91, .92, and .92 for Monday to Friday respectively.

Emotional engagement. Internal consistency estimates for daily EJE were α = .91, .92, .92, .91, and .92 for Monday to Friday respectively.

Supervisor support. Internal consistency estimates for daily SS were α = .83, .87, .85, .87, and .86 for Monday to Friday respectively.

Coworker support. Internal consistency estimates for daily CS were α = .76, .82, .81, .81, and .82 for Monday to Friday respectively.

FWC. Internal consistency estimates for daily FWC were α = .85, .88, .90, .93, and .90 for Monday to Friday respectively.

Data analysis

For baseline data, Confirmatory Factor Analysis (CFA) was used to examine the factor structure of the study items. Structural Equation Modeling (SEM) using Mplus 6.1 software was used to test the relationships among the latent variables. The goodness of fit of CFA and SEM models were determined by examining the following fit indices that are recommended in the literature: $\chi^2/$ df (relative/normed chi-square; Wheaton, Muthen, Alwin, & Summers, 1977), CFI (comparative fit index; Bentler, 1990), TLI (Tucker-Lewis Index; Tucker & Lewis, 1973; Bentler & Bonett,1980), RMSEA (root mean square error of approximation; Steiger & Lind, 1980) and its 90% confidence interval (C.I.), and SRMR (Standardized Root Mean Square Residual; Hu & Bentler, 1999). A $\chi^2/$ df ratio less than 3 indicates good model fit (Kline, 1998). CFI and TLI values larger than .90 and an SRMR value less than .08 are generally considered to indicate acceptable model fit (Hu & Bentler, 1999). RMSEA value less than .05 indicates good model fit (MacCallum, Browne, & Sugawara, 1996). The ideal lower boundary of C.I. should include or be near 0, and the upper boundary should be no larger than .08. Besides model fit, the significance of parameter estimates was also examined at an alpha level of 0.05.

For daily survey data, Hierarchical Linear Modeling (HLM) was used to examine the proposed models, using HLM 6.27 software. The significance of parameter estimates was examined at an alpha level of 0.05. Nested models were compared based on their Δ-2 X log Likelihood (Chi-square test).

Results

Before conducting tests of hypotheses, group differences were examined in the mediators and dependent variables among people who completed baseline survey but dropped out in the daily diary surveys (N=81), people who completed baseline survey but filled out less than three daily diary surveys (N=42), and people who completed baseline survey and three or more daily diary surveys (N=307).

ANOVA tests showed that there were no significant group differences in general meaningfulness ($F (2,428) = .61, p > .05$), safety ($F (2,428) = 2.26, p > .05$), availability ($F (2,428) = .35, p > .05$), physical JE ($F (2,428) = .23, p > .05$), cognitive JE ($F (2,428) = .51, p > .05$), and emotional JE ($F (2,428) = .19, p > .05$). To fully utilize the information collected from the sample, the 430 people who completed the baseline survey were used to test all between-person effects. For the within-person effects, it is recommended that multi-level analysis should use participants who provided enough data points to get sufficient within-person variation and it is a common criterion for empirical research to retain participants who complete at least half of the total daily measurement (Torres & Ong, 2010; Totenhagen, Serido, Curran, & Butler, 2012). ; Therefore, the 307 people who completed three or more daily surveys were used in analyses that included a within-persons component.

Descriptive statistics

Table 1 presents the means, standard deviations, and correlations among the study variables. Age and education level were not significantly related with any of the mediators or dependent variables. Females reported higher level of general physical JE.

As Becker (2005) pointed out, controlling a factor that is uncorrelated with the dependent variable in analyses reduces statistical power. Because age, gender, and education all had weak associations with the dependent variables and there were not strong conceptual reasons to expect that they should be controlled in order to properly interpret findings, they were not controlled in further analyses. Income level was positively related to general emotional JE and all three measures of daily JE. However, since income is monetary motivation and it satisfies peoples' financial needs, it should share variance of meaningfulness and job engagement. Controlling income in the analyses may mask the true variance shared between meaningfulness and job engagement. Therefore income level was not included as a control variable.

As hypothesized, all predictors (with two exceptions noted below) were significantly correlated with the proposed mediators and dependent variables; and mediators were also significantly correlated with the dependent variables. The only exceptions were that daily supervisor support and daily coworker support were not correlated with daily psychological safety.

Between-person effects

Confirmatory factor analysis (CFA) was conducted to examine the factor structure of the items in baseline survey. Each item was loaded on its representative factor. A sixteen-factor (predictors: skill variety, task significance, autonomy, work-role fit, supervisor support, coworker support, FWC, self-consciousness and self-efficacy; moderator: positive affectivity; mediators: meaningfulness, safety, availability;

dependent variables: physical, cognitive, and emotional JE) model was estimated using Mplus 6.1. Results showed that the sixteen-factor structure provided good fit with the data, χ^2 (1253) = 2436.37, $p < .05$, $\chi^2/ df < 2$, CFI=.93, TLI = .92, RMSEA = .047, $p > .05$, 90% C.I. = [.044, .050], and SRMR = .052. All the loadings of items on their respective latent constructs were significant, $p < .001$.

Mediation effects of three psychological conditions.

Next, a Structural equation model (SEM) was developed based on the previous sixteen-factor model. This SEM model was the hypothesized model in Figure 1 (not including moderating paths).The paths from all predictors to their proposed mediators, from all mediators to the dependent variables were freely estimated. The correlations among the distal predictors were freely estimated. The hypothesized SEM model M0 yielded good fit with the data, χ^2 (1304) = 2863.89, $p < .05$, χ^2/ df =2.20, CFI=.91, TLI = .90, RMSEA = .053, $p > .05$, 90% C.I. = [.050, .055], and SRMR = .065.

However, the proposed paths from autonomy to meaningfulness and from coworker support to safety were non-significant. Because autonomy and coworker support has been regarded as job resources, and they can increase employees' personal resources (Bakker, Demerouti, & Verbeke, 2004; Xanthopoulou, et al, 2007; Xanthopoulou, et al, 2009), I further explored availability as the mediator for autonomy- and coworker support-JE relationships. Results showed that only the path from autonomy to availability was significant. Therefore, a modified model M1 was tested based on M0, adding the path from autonomy to availability.

M1 yielded better fit with the data, $\chi 2$ (1303) = 2855.11, $p < .05$, $\chi 2$/ df =2.19,

CFI=.91, TLI = .90, RMSEA = .053, $p > .05$, 90% C.I. = [.050, .055], and SRMR = .064.

Compared to M0, $\Delta \chi 2$ (1) =8.78, $p < .05$. Therefore, M1 was a better fitting model

than M0 (adding a significant path significantly increased the model fit). In summary,

M1 was the final SEM model.

Figure 2 likewise summarizes the results for the model that was used for

hypothesis testing. The figure shows significant paths using solid lines and

non-significant paths using dash lines. Correlations among distal predictors were not

shown due to space limit.

Relationships of psychological conditions with JE: H1a-1c.

For hypothesis 1a (psychological meaningfulness is positively related to job

engagement), the paths from meaningfulness to physical JE ($\beta = .56$, $p < .001$),

cognitive JE ($\beta = .52$, $p < .001$), and emotional JE ($\beta = .85$, $p < .001$) were all

significant. Thus hypothesis 1a was supported.

For hypothesis 1b (psychological safety is positively related to job

engagement), the paths from safety to physical JE, cognitive JE, and emotional JE were

not significant. Thus hypothesis 1b was not supported and psychological safety did not

mediate the relationships between the predictors and the JEs when controlled for the

other two mediators (meaningfulness and availability).

For hypothesis 1c (psychological availability is positively related to job

engagement), the paths from availability to physical JE ($\beta = .42$, $p < .001$), cognitive

JE ($\beta = .47$, $p < .001$), and emotional JE ($\beta = .13$, $p < .05$) were significant. Thus hypothesis 1c was supported.

Meaningfulness as a mediator: H2a-2b, 3a-3b.

For hypothesis 2a (job characteristics are positively related to psychological meaningfulness), the path from skill variety to meaningfulness was significant, $\beta = .20$, $p < .01$. Thus hypothesis 2a was supported. Sobel tests showed the indirect effects of skill variety on physical JE (indirect effect = .11, SE = .03, z = 3.53, $p < .001$), cognitive JE (indirect effect = .11, SE = .03, z = 3.53, $p < .001$) and emotional JE (indirect effect = .17, SE = .05, z = 3.67, $p < .001$) through meaningfulness were all significant. Therefore, hypothesis 3a (psychological meaningfulness mediates the relationship between job characteristics and job engagement) was supported and meaningfulness mediated the relationships between skill variety and JEs.

For hypothesis 2a (job characteristics are positively related to psychological meaningfulness), the path from task significance to meaningfulness were significant, $\beta = .24$, $p < .001$. Thus hypothesis 2a was supported. Sobel tests showed the indirect effects of task significance on physical JE (indirect effect = .13, SE = .03, z = 5.30, $p < .001$), cognitive JE (indirect effect = .13, SE = .02, z = 5.33, $p < .001$) and emotional JE (indirect effect = .20, SE = .04, z = 5.85, $p < .001$) through meaningfulness were significant. Therefore, hypothesis 3a (psychological meaningfulness mediates the relationship between job characteristics and job engagement) was supported and meaningfulness mediated the relationships between task significance and JEs.

For hypothesis 2a (job characteristics are positively related to psychological meaningfulness), the path from autonomy to meaningfulness was not significant. Thus hypothesis 2a and likewise 3a (psychological meaningfulness mediates the relationship between job characteristics and job engagement) were not supported.

For hypothesis 2b (work role fit is positively related to psychological meaningfulness), the path from work-role fit to meaningfulness was significant, β = .54, $p < .001$. Thus hypothesis 2b was supported. Sobel tests showed the indirect effects of work-role fit on physical JE (indirect effect = .30, SE = .04, z = 8.37, $p < .001$), cognitive JE (indirect effect = .28, SE = .03, z = 8.23, $p < .001$) and emotional JE (indirect effect = .46, SE = .04, z = 10.76, $p < .001$) through meaningfulness were significant. Therefore, hypothesis 3b (psychological meaningfulness mediates the relationship between work role fit and job engagement) was supported; meaningfulness mediated the relationships between work-role fit and JEs.

Safety as a mediator: H4a-4b, 5a-5b.

For hypothesis 4a (supervisor support is positively related to psychological safety), supervisor support was positively related to safety, $\beta = .35$, $p < .001$. Thus hypothesis 4a was supported.

For hypothesis 4b (coworker support is positively related to psychological safety), coworker support was not significantly connected to safety. Thus, it was not supported.

Because safety was not significantly related to any of the three dimensions of

JE, hypothesis 5a (psychological safety mediates the relationship between supervisor support and job engagement) and 5b (psychological safety mediates the relationship between coworker support and job engagement) were not supported. And safety did not mediate the relationships between supervisor-support, coworker-support and JEs at the between-persons level.

Availability as a mediator: H6a-6c, 7a-7c.

For hypothesis 6a (self-consciousness is negatively related to psychological availability), the path from self-consciousness to availability was significant, $\beta = -.10$, $p < .05$. Thus hypothesis 6a was supported. Sobel tests showed the indirect effects of self-consciousness on physical JE (indirect effect = -.04, SE = .02, z = -1.91, $p > .05$), cognitive JE (indirect effect = -.05, SE = .02, z = -1.92, $p > .05$) and emotional JE (indirect effect = -.01, SE = .01, z = -1.80, $p < .05$) through availability were all non-significant. Therefore, hypothesis 7a (psychological availability mediates the relationship between self-consciousness and job engagement) was not supported.

For hypothesis 6b (FWC is negatively related to psychological availability), the path from FWC to availability was significant, $\beta = -.20$, $p < .001$. Thus hypothesis 6b was supported. Sobel tests showed the indirect effects of FWC on physical JE (indirect effect = -.09, SE = .03, z = -3.40, $p < .001$), cognitive JE (indirect effect = -.10, SE = .03, z = -3.53, $p < .001$) and emotional JE (indirect effect = -.03, SE = .01, z = -2.85, $p < .01$) through availability were all significant. Therefore, hypothesis 7b (psychological availability mediates the relationship between family-work conflict

and job engagement) was supported. Availability mediated the relationship between

FWC and JEs.

For hypothesis 6c (self-efficacy is positively related to psychological

availability), the path from self-efficacy to availability was significant, $\beta = .42$, p

$< .001$. Thus hypothesis 6c was supported. Sobel tests showed the indirect effects of

self-efficacy on physical JE (indirect effect = .18, SE = .04, z = 4.93, $p < .001$),

cognitive JE (indirect effect = .20, SE = .04, z = 5.43, $p < .001$), and emotional JE

(indirect effect = .06, SE = .02, z = 3.51, $p < .001$) through availability were significant.

Therefore, hypothesis 7c (psychological availability mediates the relationship between

self-efficacy and job engagement) was supported; availability mediated the

relationships between self-efficacy and JEs.

Not previously proposed, the paths from autonomy to availability ($\beta = .14$, p

$< .01$) were also significant. Sobel tests showed the indirect effects of autonomy on

physical JE (indirect effect = .06, SE = .02, z = 2.80, $p < .01$), cognitive JE (indirect

effect = .06, SE = .02, z = 2.86, $p < .01$) and emotional JE (indirect effect = .02, SE = .01,

z = 2.40, $p < .05$) through availability were all significant. Therefore, availability

mediated the relationships between autonomy and JEs.

Main effects of PA: H8a-8b.

For hypothesis 8a (PA is positively related to the three psychological

conditions), the paths from PA to meaningfulness ($\beta = .09$, $p < .05$), safety ($\beta = .27$, p

$< .001$), and availability ($\beta = .13$, $p < .05$) were all significant. Thus, hypothesis 8a

was supported.

The paths from PA to physical JE ($\beta = .23$, $p < .001$) and cognitive JE ($\beta = .15$, $p < .01$) were significant, but the path from PA to emotional JE was not significant, $\beta = .06$, $p = .08$. Therefore, hypothesis 8b (PA is positively related to job engagement) was partially supported.

Moderation Effects of PA: H9.

To test the proposed moderation effects of PA (hypothesis 9- PA moderates the relationships between the distal antecedents and the three psychological conditions, such that the relationships are stronger for employees with low levels of PA), multiple regression was used to examine whether the interaction terms were significant after controlling the main effects. In the regression model, a block of proposed predictors and PA were first entered. Then, the interaction products of proposed predictors and PA were entered. The R^2 change of the model and regression coefficients of interaction products were examined. Since many interaction products were non-significant, the R^2 change became non-significant as a whole block even if there were several significant interaction products. Therefore, only the significant interaction products were entered in the final moderation models. All the variables were centered.

Meaningfulness, safety, and availability were entered as outcomes separately. Table 2 summarizes the results of the moderation regression models.

For meaningfulness, there was no significant interaction product, $\Delta R^2 < .01$,

$p > .05$. Therefore, PA did not moderate the relationships between predictors and

meaningfulness.

For safety, the interaction term of coworker support X PA was significant,

$\beta = -.09$, $p < .05$, $\Delta R^2 = .01$, $p < .05$. Specifically, for people with low levels of PA (1

SD below mean), the relationship between coworker support and safety was positively

significant, $r = .13$, $p < .05$; but for people with high levels of PA (1 SD above mean),

the relationship between coworker support and safety was non-significant, $r = -.02$,

$p > .05$. Figure 3 illustrates this moderation effect.

For availability, the interaction term of supervisor support X PA was

significant, $\beta = -.15$, $p < .001$, $\Delta R^2 = .02$, $p < .001$. Specifically, for people with low

levels of PA, the relationship between supervisor support and availability was positive

and significant, $r = .15$, $p < .05$; but for people with high levels of PA, the relationship

between supervisor support and availability was non-significant, $r = -0.02$, $p > .05$.

Figure 4 illustrates this moderation effect.

Within-person effects

The repeated daily data can be viewed as multi-level data, with repeated

measurements nested within person. This leads to a two-level model with the repeated

measures at the first-level (N= 1487 study occasions) and the individual persons at the

second-level (N = 307 participants). Due to the nested nature of the data and study

focus on testing a mediation model at within-person level, Multi-level analysis with

Hierarchical Linear Modeling (HLM) was applied.

Fluctuations over time.

To examine the proportion of variance that is attributed to the different levels of analysis, I calculated the intra-class correlation (ICC) for each day-level variable. Results showed that 60% of the variance in physical JE, 58% in cognitive JE, and 75% in emotional JE was attributable to between-person variations. Furthermore, 76% of the variance in meaningfulness, 58% in safety, and 64% in availability was attributable to between-person fluctuations. Finally, 62% of the variance in supervisor support, 57% in coworker support, and 66% in FWC was attributable to between-person variations. In all cases, significant amounts of variance are left to be explained by within-person fluctuations. This justifies a multi-level approach. In the following HLM modeling, level-1 variables were entered using the group mean (centered around the person), and level-2 variables were entered using the grand mean (centered around the whole sample).

Within-person mediation effects of three psychological conditions: H4a-4b, H5a-5b, H6b, H7b.

According to the proposed hypotheses, day-level meaningfulness, safety, and availability mediate the relationships between day-level predictors (supervisor support, coworker support, and FWC) and day-level JEs. Following Baron and Kenny (1986), three required conditions for mediation were examined: (a) the predictor should be related to the mediator; (b) the mediator should be related to the outcome; and (c) the predictor–outcome relationship becomes non-significant (full mediation), or becomes

significantly weaker (partial mediation) after the inclusion of the mediator. To examine the significance of the mediating effects, Sobel z-test was used.

To test condition (a), three HLM models were examined in which day-level supervisor support, coworker support, and FWC were entered as level-1 predictors, and day-level meaningfulness, safety, and availability were treated as outcomes separately.. General meaningfulness, safety, and availability were also treated as control variables at level-2 in corresponding HLM model. Day-level Supervisor support ($\gamma = .09$, $p < .01$), coworker support ($\gamma = .12$, $p < .01$), and FWC ($\gamma = -.09$, $p < .01$) were significantly related to day-level meaningfulness. However, only day-level FWC was significantly related to day-level safety ($\gamma = -.11$, $p < .01$), day-level supervisor and coworker support were non-significant. Thus, hypotheses 4a (supervisor support is positively related to psychological safety), 4b (coworker support is positively related to psychological safety), 5a (psychological safety mediates the relationship between supervisor support and job engagement), and 5b (psychological safety mediates the relationship between coworker support and job engagement) were not supported. Day-level coworker support ($\gamma = .08$, $p < .01$) and FWC ($\gamma = -.10$, $p < .01$) were significantly related to day-level availability, supporting Hypothesis 6b (FWC is negatively related to psychological availability). Table 3 provides details of these results.

To test condition (b), three HLM models were examined in which day-level meaningfulness, safety, and availability were entered as level-1 predictors, and

day-level physical, cognitive, and emotional JE were treated as outcomes separately. General physical, cognitive, and emotional JE were also treated as control variables at level-2 in corresponding HLM model. Day-level safety was only significantly related to day-level emotional JE ($\gamma = .08$, $p < .01$), but non-significant to day-level physical and cognitive JE. Thus, Hypothesis 1b was partially supported. Day-level meaningfulness was significantly related to day-level physical JE ($\gamma = .20$, $p < .001$), cognitive JE ($\gamma = .30$, $p < .001$), and emotional JE ($\gamma = .23$, $p < .001$). Day-level availability was significantly related to day-level physical JE ($\gamma = .46$, $p < .001$), cognitive JE ($\gamma = .44$, $p < .001$), and emotional JE ($\gamma = .52$, $p < .001$). Hypothesis 1a ((psychological meaningfulness is positively related to job engagement) and 1c (psychological availability is positively related to job engagement) were supported. Table 4 summarized the results.

For condition (c), nested models were compared. The first model was estimated in which control variables and predictors were entered. The second model was estimated in which the mediators were entered besides the variables in the first model. Models were estimated for physical, cognitive, and emotional JE separately. In the first models, predictor-JEs relationships were all significant except the coworker support-cognitive JE relationship. In the second models, the predictor - JEs relationships became non-significant or weaker after the three mediators entered into the model. The change of -2 X log likelihood was used to compare the model fit

between HLM models. The Δ-2 X log likelihoods were all significant, which meant the mediators significantly improved model fit. Table 5 summarizes these results.

For meaningfulness as mediator, the indirect effects of supervisor support on physical JE ($ab = .04$, z =3.01, $p < .01$), cognitive JE ($ab = .04$, z = 3.00, $p < .01$), and emotional JE ($ab = .05$, z = 3.06, $p < .01$) were significant. The indirect effects of coworker support on physical JE ($ab = .06$, z =3.44, $p < .001$), and emotional JE ($ab = .06$, z = 3.51, $p < .001$) were significant. The indirect effects of FWC on physical JE ($ab = -.04$, z =-2.75, $p < .01$), cognitive JE ($ab = -.04$, z = -2.74, $p < .01$), and emotional JE ($ab = -.05$, z = -2.78, $p < .01$) were significant.

For safety as mediator, the indirect effect of FWC on emotional JE ($ab = -.01$, z = -1.87, $p > .05$) was non-significant.

For availability as mediator, the indirect effects of coworker support on physical JE ($ab = .02$, z = 2.82, $p < .01$), and emotional JE ($ab = .02$, z = 3.24, $p < .01$) were significant. The indirect effects of FWC on physical JE ($ab = -.02$, z =-2.62, $p < .01$), cognitive JE ($ab = -.03$, z = -2.93, $p < .01$), and emotional JE ($ab = -.02$, z = -2.93, $p < .01$) were significant. Therefore, hypothesis 7b (psychological availability mediates the relationship between family-work conflict and job engagement) was supported.

Moderation effects of PA on within-person relationships: H9.

If PA moderates the relationships between predictors-psychological conditions, it means the slopes of these relationships vary among people who have different levels of PA. The equations below give an example of the estimated moderation HLM

models.

Level 1: $Y = \pi_0 + \pi_1 X1 + \pi_2 X2 + \pi_3 X3 + \ldots + \varepsilon$

Level 2:

$\pi_0 = \beta_{00} + \beta_{01}PA + \beta_{02}CV1 + \beta_{03}CV2 + \ldots + r_0$

$\pi_1 = \beta_{10} + \beta_{11}PA + r_1$

$\pi_2 = \beta_{20} + \beta_{21}PA + r_2$

$\pi_3 = \beta_{30} + \beta_{31}PA + r_3$

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For example, if PA moderates the relationship between X1 and Y, β_{11} should

be significant.

Three HLM models examined whether PA moderates the relationships

between day-level predictors (supervisor support, coworker support, and FWC) and

day-level mediators (meaningfulness, safety, and availability). General

meaningfulness, safety, and availability were entered at level-2 as control variables

for the corresponding outcome. Table 6 summarized the results. The only significant

moderation effect is PA on the day-level supervisor support-availability slope, $\beta = -.07$,

$p < .05$. The two-way interaction effects computation tool

(http://www.quantpsy.org/interact/hlm2.htm) was used to calculate the simple slopes

(Preacher, Curran, & Bauer, 2006). For people with PA score = 1, simple slope = .26,

t=3.09, $p < .01$; and for people with PA score = 3, simple slope = .10, t=3.32, $p < .01$;

but for people with PA score = 5, simple slope = -.05, t=-1.28, $p > .05$. The PA region

for the day-level supervisor support-availability slope to be significant was [0, 3.77].

Figure 5 illustrated the moderation effect of PA.

In summary, Figure 6 summarizes the mediation and moderation effects at the day-level.

Research Question: Interactions among psychological conditions

Multiple moderation regression models were examined to explore the interactive effects of meaningfulness, safety, and availability on JE using the baseline data. Table 7 summarizes the results. None of the interaction terms were significant in the models. The main effects of meaningfulness and availability on JE were all significant, $p < .001$, but for safety, only the main effect on emotional JE was significant, $p < .05$.

Moderation models for HLM were examined for the daily data. Day-level meaningfulness, safety, availability, and the four interaction products were entered as level-1 predictors for JE. Table 8 summarizes the results. Similar to the results for baseline data, none of the interaction terms were significant in the HLM models. Main effects of day-level meaningfulness and availability on day-level JEs were all significant, $p < .001$, but day-level safety was only significantly related to day-level emotional JE, $p < .01$.

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Discussion

The current study was intended to deepen our understanding of the impacts of three psychological conditions (meaningfulness, safety, and availability) on JE based on Kahn's model (1990). Specifically, the main effects, mediating effects, and interaction effects of these three psychological conditions on physical, cognitive, and emotional JE were examined using both between-person and within-person data collected with a daily diary methodology.

Results of the current study demonstrated that meaningfulness and availability were significantly and positively related to physical, cognitive, and emotional JE both at the between-person level and the within-person-level. Furthermore, most of the hypothesized mediating effects of meaningfulness and availability on the distal predictors-JEs relationships were supported both at the between-person level and the within-person-level. This is consistent with the findings of previous cross-sectional research (May, Gilson, & Harter, 2004; Olivier & Rothmann, 2007), and provides support for Kahn's theoretical model of job engagement

It should be noted that the main effects and mediation effects of meaningfulness were the strongest, suggesting meaningfulness was the dominant driver for job engagement. This finding is consistent with previous study on job engagement (Olivier & Rothmann, 2007), and reinforces Hackman and Oldham's (1980) job characteristics model. Meaningfulness serve as an important and strong motivational psychological state that leads to job engagement and further favorable organization outcomes such as job performance, commitment, and organizational

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citizenship behaviors, et al. The dominant driving effect of meaningfulness on job engagement indicates that organizations interested in job engagement would be well advised to focus on job design and enrichment. In recent decades, jobs have become more and more specialized and work tasks tend to be repetitive and routinized. Thus lack of meaningfulness may become a serious issue for many employees. Research suggests that job crafting is an effective strategy to improve work meaningfulness (Berg, Dutton, & Wrzesniewski, 2013). This approach puts employees "in the driver's seat". Employees actively identify opportunities to craft their jobs and redesign their work tasks to better suit their motives, strengths, and passions and thus improve meaningfulness in work.

Availability was found to be another significant predictor of job engagement. Peoples' physical, cognitive, and emotional resources are limited. Job engagement requires that people possess or believe they possess sufficient resources and energies to invest in work tasks when also dealing with outside-work demands and work stressors. This indicates that organizations should not design jobs that ask for too much resources and energies. High job load and demanding environment lead to exhaustion and stress, and thus prevent employees from being able to engage in their work role.

Among the three proposed psychological mediating mechanisms, psychological safety was only significantly and positively related to the emotional job engagement at both between- and within-person levels,, and it did not mediate effects

of supervisor or coworker support on job engagement as hypothesized. However, the comparatively weak connection between safety and job engagement does not necessarily mean that safety is not important for job engagement. It is possible that the impact of safety on job engagement depends on specific industry and culture. For example, in industries that tolerate for sexual-harassment and hold strict hierarchies, perceived low safety and high threats may strongly prevent employees to truly express and voice themselves and withdraw from their work. For such industries, safety is likely to emerge as a salient predictor for job engagement. Moreover, the current study tested Kahn's model in a culture that is characterized as high in individualism, but the effect of safety on job engagement may be stronger in a collectivist culture. In collectivist cultures, social environment and interpersonal relationships have profound impacts on people in general (Hui & Triandis, 1986). For example, an empirical study (Botero & Van Dyne, 2009) found that high power distance (employees' belief that supervisors are entitled to privilege, high status, and power; typical characteristic of collectivist culture) was related to low levels of employees' voice behaviors.

The interactive effects of the three conditions were non-significant. This indicates that the effects of the three psychological conditions were non-compensatory: employees have high-levels of JEs only when each of the three psychological conditions meets their threshold (safety only for emotional job engagement). Employees will not engage in work even though they are full of energy if the work itself is not important and valuable; and employees are not able to engage in work

even though the work has great impact on career development if they are too tired and depleted of energy from previous work tasks. The finding of non-compensatory effects of meaningfulness, safety, and availability indicates that organizations should use a systematic approach to improve employees' engagement. Neglecting any one aspect is unwise.

The current study extended Kahn's model (1990) by incorporating one important individual factor-PA. PA has been recognized as "trait engagement" (Macey & Schneider, 2008). Employees with high levels of PA are believed to be more likely to engage in their work in a general way. And this is supported by the current study. PA was significantly and positively related to all three psychological conditions and job engagement both at the between- and within-person level. In addition, the current study also found the moderating effects of PA on the distal predictors-psychological conditions relationships. More specifically, the positive relationship between supervisor support and availability and the positive relationship of coworker support-safety were stronger for employees with low-levels of PA. These results indicate that high-levels of PA can somehow compensate the low-levels of supervisor and coworker support. This is consistent with the "feelings-as-information" proposition (Schwarz, 2013), positive feeling, emotions, and mood can serve as source of information and thus influence peoples' evaluation and appraisal. For employees with high-levels of PA, they are generally disposed to evaluate the situations more positive and are more likely to act and engage in their job. For

employees with low-levels of PA, the situational cues of supervisor and coworker

support become more salient and important. These findings indicate that keeping

positive emotions and feelings are important for job engagement. Although

organizations cannot reshape employees' disposition of positive affect, organizations

may still try some training programs on emotion regulation and management to

increase job engagement.

The current study also found that meaningfulness, safety, and availability had

different driving sources. Consistent with Kahn (1990), primary source of

meaningfulness come from the organization and work. Specifically, task significance,

skill variety, and work-role fit had a significant and positive effect on meaningfulness.

Sources of safety mainly come from interpersonal relationships in the work

environment. Supervisor support is positively related to safety. Coworker support also

had a positive impact on safety for employees with low PA. Moreover, sources of

availability are from individual and organization. Individual source of availability

include factors that influence the total amount of and allocation of peoples' resources.

Specifically, self-consciousness, self-efficacy, and FWC were significantly connected

to availability. The primary organization source of availability was autonomy. High

autonomy means employees can decide what, when, how to do their job their own.

The freedom and control make employees utilize their resources for work in a more

efficient and effective way. Although not hypothesized, supervisor and coworker

support were also positively associated with meaningfulness. First, this indicates that

these personal interactions are valued by employees in their daily life. Supervisor- and coworker- support can be viewed as returns of their investment in their job. And belongingness itself is important and valuable for people (Maslow, 1943). Second, whether one's work is important, worthwhile and meaningful is somehow determined by the cues in social interactions. Employees may feel that supervisors and coworkers give them supports because they are doing important and meaningful work; and none or low-levels of support indicate that nobody cares about the work they are doing.

Last but not least, the current study showed that emotional job engagement had different patterns of relationships with the three psychological conditions than physical and cognitive engagement had with these conditions. The magnitudes of relationships between psychological conditions and physical and cognitive job engagement were close. However, meaningfulness had the strongest connection to emotional job engagement at both between- and within-person level. Also safety was only associated with emotional engagement. Therefore the current study provides support for Kahn's differentiation of the three dimensions (at least, emotional job engagement is differentiated from physical and cognitive job engagement).

Contributions to the literature

The present research makes several contributions to the literature. First of all, to my best knowledge, this is the first study to examine Kahn's model (1990) using daily diary data. The results demonstrated that both the three facets of job engagement and the three psychological conditions that promote job engagement fluctuated on a

daily basis. Utilizing daily diary approach better captures the dynamic nature of these

variables and provides more accurate estimates of their relationships. For example,

the relationship between meaningfulness and emotional job engagement was high

at .85 at the between-person level. But the relationship was at medium magnitude

at .52 at within-person level. This indicates that the substantial daily fluctuations of

emotional engagement were attributed to some other organizational or personal

factors, although meaningfulness was the primary factor to differentiate people with

low or high emotional engagement. Second, the current study explored the

moderating effects of PA in the job engagement model. Results supported the idea that

PA is "trait engagement". High-levels of PA were associated with high-levels of job

engagement. Moreover, high-levels of PA may compensate for low levels of

supervisor and coworker support, such that supervisor support-availability and

coworker support-safety relationships were stronger when PA was low. This indicates

the positive feelings, emotions, and mood play an important role in the work place.

Furthermore, the current study also examined the interactive effects of the three

psychological conditions. Results suggest that there were no compensatory effects.

This finding suggests that all three psychological conditions have their own unique

driving effect on job engagement. In addition, meaningfulness was the strongest

driver of job engagement among the three. This finding reinforces the importance of

meaningfulness as a motivational psychological state in the job characteristics model

(Hackman & Oldham, 1980). Also safety only contributed to emotional job

engagement. This suggests that Kahn's original model may need some refining on the relationship between safety and job engagement. Potential moderators may exist such as industry and culture of individualism/collectivist.

Implications for practitioners

The findings of this study have potentially important practical implications. Results showed that high levels of meaningfulness, availability, and safety were connected to high levels of physical, cognitive, and emotional job engagement. To improve employees' job engagement, organizations should take all three predicting psychological conditions into account and use a systematic approach. Because meaningfulness acts as the dominant driver, organizations should focus on job design to fulfill the work tasks of importance and values. Selecting job candidates who share similar believes, values, and interests with the organizations may also improve employees' meaningfulness. Besides this up-to-bottom way, organizations should also encourage the bottom-to-up job crafting initiated by employees and provide autonomy and support for doing so. In support, empirical research found that job crafting behaviors increased work engagement and job performance (Petrou, Demerouti, Peeters, Schaufeli, & Hetland, 2012; Tims, Bakker, Derks, & van Rhenen, 2013). Organizations should also create and promote good culture that facilitates supportive and trusting interpersonal relationships, and provide safe environments and atmospheres that encourage open expression and voice of one's true concerns, opinions, and ideas. A just and democratic workplace increases job engagement

(Rothschild, 2000). Moreover, organizations should put reasonable workloads on employees and offer flexible work solutions. For example, employees' schedule control has been documented to have a positive impact on job engagement (Swanberg, McKechnie, Ojha, & James, 2011). Organizations may also provide help to employees to solve the potential conflicts between work demands and outside-work demands. For example, organizations may use on-site daycare centers and generous personal leaves to reduce the FWC. Finally, keeping positive feelings, emotions, and affections is also important for job engagement. On one hand, organizations may select job candidates with high levels of PA. On the other hand, organizations may provide employees with some trainings and interventions on emotion regulation and management.

Strengths, limitations and future research

One advantage of this study lies in its use of both cross-sectional and daily diary data. Testing the hypotheses based on between- and within-person effects provides stronger evidence of the proposed relationships. Second, data were collected from a sample from diverse industries. Therefore, findings of the current study have high generalizability in U.S. industries.

Nonetheless, several limitations of this study must be acknowledged. First, this study is potentially limited in its exclusive dependence on self-reported data. The common bias from the single-source data raises the concern of biased estimation of the substantial relationships. However, the daily diary design offsets this concern

somewhat because data were from several days, and many baseline variables were controlled in the day-level models. Second, lack of temporal separation of the study variables make it difficult to make conclusions about causality among the study variables. Third, the current study only tested the moderation effects of PA, and some other personality variables may also be important in the studied relationships. For example, Big Five personality has been found to be significantly connected to job engagement (Inceoglu & Warr, 2011). Finally the internal consistency of the safety scale was rather low. This may result from the reverse wording items in the scale (Schriesheim & Hill, 1981). The low internal consistency of the safety scale may influence the estimates of the relationships between safety and job engagement.

Future study should examine the job engagement model using longitudinal designs to better understand the causal flow of the distal predictors, psychological conditions, and job engagement. Second, studies should also explore other potential moderators in the model. For example, some personality factors such as Big Five personality characteristics may also be considered and introduced in Kahn's JE model. Empirical study (Inceoglu & Warr, 2011) has found that Big Five personality characteristics were significantly related to job engagement; they may also serve as moderators of relationships between work context features and job engagement. In addition, Macey and Schneider (2008) had pointed out that proactive personality and autotelic personality impact job engagement. Future research may explore how these personal dispositions interact with work situations to influence job engagement. Third,

another fruitful research avenue would be testing the source and job engagement outcome of safety in certain industries. For certain industries with high demands of interpersonal interactions, perceived psychological safety becomes a salient issue to truly express and voice oneself. Moreover, Kahn's model was developed based on his observation and interview with employees in an individualistic culture. However, in collectivist cultures, the strict hierarchy and unequal status may make safety more important for job engagement because employees are attentive to other people and try to keep similarity with the group. Therefore, perceived safety from the interpersonal environment emerges as the important guarantee to truly express and speak out oneself.

Conclusion

The current study examined the effects of meaningfulness, safety, and availability on JEs, and also the moderating effects of PA using cross-sectional and daily diary data. Results indicated that meaningfulness and availability were significantly and positively related to physical, cognitive, and emotional job engagement at between- and within-person level; safety was only significantly connected to emotional JE at between- and within-person level. Furthermore the effects of the three psychological mechanisms on job engagement were non-compensatory. Moreover, meaningfulness mediated the effects of skill variety, task significance, work-role fit, supervisor support, and coworker support on all three aspects of JE. Availability mediated the effects of FWC, self-efficacy, and autonomy

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on all three aspects of job engagement. PA was demonstrated to be positively

associated with job engagement and it also moderated the supervisor

support-availability, and coworker support-safety relationships, such that these

positive relationships were stronger when PA was low. The current study provides

additional support for Kahn's model of psychological conditions promoting job

engagement, and identifies further opportunities for refining and extending the model.

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Table 1 Means, SDs, and Correlations among the Study Variables

Variable		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
General	level																
1	Age	36.21	10.02	—													
2	Gender	—	—	.07	—												
3	Education	—	—	-.07	.04	—											
4	Income	—	—	.11*	-.07	.24**	—										
5	Skill variety	3.61	0.96	.08	.00	.16**	.33**	—									
6	Task significance	3.63	0.98	-.01	.21**	.09	.15**	.48**	—								
7	Autonomy	3.90	0.89	.07	.04	.02	.28**	.39**	.26**	—							
8	Work-role fit	3.62	1.04	.04	.05	.00	.23**	.64**	.55**	.42**	—						
9	Supervisor support	3.72	0.92	-.03	.02	.06	.09	.32**	.34**	.31**	.45**	—					
10	Coworker support	3.75	0.83	-.04	.01	.07	.08	.37**	.32**	.25**	.45**	.60**	—				
11	Self-consciousness	2.53	1.09	-.14**	.07	.08	.03	-.08	.01	-.07	-.12*	-.12*	-.07	—			
12	FWC	1.92	0.82	-.08	.06	-.01	.03	-.04	.05	-.12*	-.04	-.15**	-.15**	.35**	—		
13	Self-efficacy	4.20	0.68	-.01	.05	.02	.12*	.35**	.28**	.23**	.35**	.35**	.36**	-.33**	-.26**	—	
14	Positive Affectivity	3.84	0.70	.07	.05	.03	.13**	.42**	.40**	.24**	.46**	.36**	.35**	-.20**	-.10*	.58**	—
15	Meaningfulness	3.80	0.99	.07	.08	.02	.21**	.65**	.65**	.36**	.79**	.45**	.42**	-.08	.01	.41**	.53**
16	Safety	4.09	0.78	.05	.01	.01	.06	.25**	.20**	.36**	.34**	.39**	.33**	-.36**	-.28**	.38**	.30**
17	Availability	4.34	0.63	.04	.01	-.03	.02	.18**	.21**	.28**	.28**	.34**	.30**	-.30**	-.31**	.56**	.40**
18	Physical JE	4.04	0.78	.08	.11*	-.03	.02	.45**	.45**	.18**	.48**	.36**	.34**	-.16**	-.14**	.44**	.52**
19	Cognitive JE	3.99	0.85	.09	.08	-.05	.03	.41**	.36**	.20**	.50**	.35**	.28**	-.23**	-.21**	.42**	.48**
20	Emotional JE	3.84	1.01	.02	.09	.03	.20**	.63**	.58**	.39**	.52**	.49**	.47**	-.12*	-.08	.46**	.56**

Table 1 Continue
Means, SDs, and Correlations among the Study Variables

Variable		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Daily	level																
21	Daily supervisor support	3.01	0.85	-.16**	.01	-.05	.11	.20**	.31**	.20**	.42**	.51**	.35**	-.05	.01	.21**	.31**
22	Daily coworker support	3.22	0.78	-.16**	-.05	-.04	.07	.23**	.28**	.07	.38**	.36**	.56**	.07	.01	.24**	.29**
23	Daily FWC	1.72	0.74	-.10	.10	.08	-.02	-.02	.01	-.16**	-.09	-.11	-.12*	.24**	.61**	-.16**	-.10
24	Daily meaningfulness	3.60	0.94	.07	.07	.03	.26**	.54**	.55**	.34**	.65**	.49**	.42**	-.03	-.06	.38**	.54**
25	Daily safety	4.25	0.62	.17**	.03	-.05	.03	.18**	.09	.29**	.22**	.32**	.22**	-.32**	-.26**	.40**	.30**
26	Daily availability	4.22	0.60	.12*	-.01	.03	.07	.13*	.16**	.29**	.25**	.34**	.30**	-.27**	-.30**	.46**	.38**
27	Daily physical JE	3.75	0.77	.07	.06	.03	.12*	.44**	.41**	.21**	.51**	.43**	.36**	-.10	-.14*	.43**	.57**
28	Daily cognitive JE	3.81	0.77	.10	.03	.00	.12*	.38**	.32**	.24**	.48**	.42**	.33**	-.16**	-.17**	.43**	.54**
29	Daily emotional JE	3.59	0.94	.04	.06	.03	.26**	.53**	.50**	.36**	.69**	.54**	.45**	-.09	-.09	.43**	.59**

Table 1 Continue

Variable		15	16	17	18	19	20	21	22	23	24	25	26	27	28
General	level														
15	Meaningfulness	—													
16	Safety	.31**	—												
17	Availability	.30**	.47**	—											
18	Physical JE	.62**	.30**	.43**	—										
19	Cognitive JE	.61**	.29**	.45**	.79**	—									
20	Emotional JE	.86**	.37**	.38**	.65**	.65**	—								
Daily	Level														
21	Daily supervisor support	.45**	.23**	.19**	.30**	.27**	.46**	—							
22	Daily coworker support	.38**	.16**	.14*	.29**	.23**	.37**	.65**	—						
23	Daily FWC	-.04	-.29**	-.33**	-.18**	-.21**	-.11	.04	.03	—					
24	Daily meaningfulness	.77**	.32**	.28**	.63**	.57**	.77**	.54**	.47**	-.15*	—				
25	Daily safety	.19**	.53**	.43**	.27**	.22**	.30**	.09	.06	-.40**	.31**	—			
26	Daily availability	.31**	.44**	.57**	.41**	.41**	.40**	.24**	.20**	-.48**	.43**	.63**	—		
27	Daily physical JE	.61**	.31**	.28**	.73**	.65**	.64**	.45**	.42**	-.19**	.77**	.33**	.48**	—	
28	Daily cognitive JE	.56**	.32**	.31**	.66**	.67**	.62**	.45**	.37**	-.32**	.75**	.38**	.57**	.90**	—
29	Daily emotional JE	.76**	.35**	.30**	.63**	.59**	.80**	.56**	.49**	-.20**	.92**	.34**	.49**	.81**	.82**

Note. N= 430 for general level variables; N= 307 for daily level variables. Daily-level data was averaged across the five days. Gender was coded as 0=male, 1=female. Education level was coded as 0=below college degree, 1= college degree or above. Income level was coded as 0=less than $50,000/year, 1= $50,000/year or more.

p <.05, **p* <.01

Table 2 Summary of the final moderation regression models – psychological conditions as outcome

Predictor	Meaningfulness		Safety		Availability	
	R^2	β	R^2	β	R^2	β
Step 1: Main effects	.72***		.33***		.39***	
Skill variety		.18***		-.03		.06
Task significance		.24***		.02		.07
Autonomy		.01		.22***		.17***
Work-role fit		.47***		.07		.03
Supervisor support		.08*		.17**		.10*
Coworker support		.02		.06		.02
Self-consciousness		.02		-.24***		-.09*
FWC		.03		-.11*		-.16***
Self-efficacy		.05		.13*		.38***
PA		.08*		.01		.06
Step 2: Interactions	.72***		.34***		.41***	
ΔR²	<.01		.01*		.02***	
	All interactions	Non-sig	Coworker support ✕ PA	-.09*	Supervisor support ✕ PA	-.15***

Note. N= 430. *p <.05, **p <.01, ***p < .001

Table 3 Multilevel estimates for models predicting day-level psychological conditions

	Meaningfulness				Safety				Availability			
	Estimate	SE	t	R^2	Estimate	SE	t	R^2	Estimate	SE	t	R^2
Intercept	3.51***	.06	57.66		4.23***	.06	76.72		4.21***	.05	80.25	
Baseline DV	.71***	.07	12.70		.44***	.06	7.11		.55***	.05	10.20	
Daily supervisor support	.09**	.03	3.12		.03	.03	.97		.01	.02	.13	
Daily coworker support	.12**	.03	3.61		.01	.03	.38		.08**	.02	3.75	
Daily FWC	-.09**	.03	-2.83		-.11**	.04	-3.19		-.10**	.03	-3.30	
Level 1 Variance				28%				17%				16%
Level 2 Variance				63%				30%				35%

Note. N=1487 occasions at level-1, N=307 participants at level-2. *p <.05, **p <.01, ***p < .001

Table 4 Multilevel estimates for models predicting day-level JEs using mediators

	Physical JE				Cognitive JE				Emotional JE			
	Estimate	SE	t	R^2	Estimate	SE	t	R^2	Estimate	SE	t	R^2
Intercept	3.66***	.06	60.85		3.76***	.06	65.87		3.53***	.06	59.99	
Baseline DV	.71***	.04	15.88		.61***	.05	11.89		.74***	.04	19.89	
Daily meaningfulness	.46***	.04	11.62		.44***	.04	10.92		.52***	.03	15.40	
Daily safety	-.06	.04	-1.72		.03	.04	.75		.07**	.03	2.73	
Daily availability	.20***	.05	4.30		.30***	.05	6.42		.23***	.04	6.43	
Level 1 Variance			42%				40%				54%	
Level 2 Variance			56%				48%				65%	

Note. N=1487 occasions at level-1, N=307 participants at level-2. *p <.05, **p <.01, ***p < .001

Table 5 Multilevel estimates for nested models predicting day-level JEs using predictors and mediators

	Physical JE		Cognitive JE		Emotional JE	
	M1	M2	M1	M2	M1	M2
Step 1						
Intercept	3.66***	3.66***	3.77***	3.77***	3.54***	3.53***
Baseline DV	.71***	.71***	.62***	.61***	.75***	.75***
Daily supervisor support	.18***	.13***	.16***	.13***	.14***	.10***
Daily coworker support	.07*	.01	.06	.02	.13***	.04
Daily FWC	-.14**	-.07	-.21***	-.13**	-.16***	-.07*
Step 2						
Daily meaningfulness		.45***		.42***		.51***
Daily safety		—		—		.08**
Daily availability		.16**		.28***		.19***
Δ-2 X log Likelihood		243.69***		252.61***		449.99***
Level 1 Variance ΔR^2		17%		18%		31%
Level 2 Variance ΔR^2		4%		3%		4%

Note. N=1487 occasions at level-1, N=307 participants at level-2. *p <.05, **p <.01, ***p < .001

    Daily safety was not entered because it was not significantly related to DV based on Table 4

Table 6 Multilevel estimates for moderation models predicting day-level psychological conditions

	Meaningfulness				Safety				Availability			
	Estimate	SE	t	R^2	Estimate	SE	t	R^2	Estimate	SE	t	R^2
Intercept	3.52***	.06	56.93		4.26***	.06	74.81		4.24***	.05	80.15	
Baseline DV	.63***	.08	8.02		.41***	.06	6.78		.48***	.06	7.33	
PA	.19*	.10	1.96		.14*	.06	2.24		.18**	.07	2.65	
Daily SS	.09**	.03	3.17		.03	.03	1.07		.01	.02	.09	
Daily CS	.12**	.03	3.55		.01	.03	.32		.08***	.02	3.84	
Daily FWC	-.10**	.03	-2.88		-.12**	.04	-3.24		-.10**	.03	-3.41	
PA on daily SS-DV slope	-.01	.05	-.16		.07	.04	1.71		-.07*	.03	-2.14	
PA on daily CS-DV slope	-.01	.06	-.23		-.02	.04	-.48		-.03	.04	-.86	
PA on daily FWC-DV slope	-.04	.04	-1.01		-.03	.05	-.55		-.04	.05	-.88	
Level 1 Variance				28%				17%				16%
Level 2 Variance				64%				33%				39%

Note. N=1487 occasions at level-1, N=307 participants at level-2. *p <.05, **p <.01, ***p < .001

Table 7 Summary of the final moderation regression models – interactions of psychological conditions

Predictor	Physical JE		Cognitive JE		Emotional JE	
	R^2	β	R^2	β	R^2	β
Step 1: Main effects	.46***		.45***		.77***	
Meaningfulness		0.59***		0.58***	0.82***	
Safety		0.05		0.02	0.06*	
Availability		0.34***		0.36***	0.12***	
Step 2: Interactions	46***		.45***		.77***	
Safety X meaningfulness		0.07		0.07	-0.02	
Availability X meaningfulness		-0.08		-0.04	-0.03	
Safety X availability		0.08		0.02	-0.03	
Three-way interaction		-0.07		-0.06	-0.05	
ΔR^2	<.01		<.01		<.01	

Note. N= 430. *p <.05, **p <.01, ***p < .001

Table 8 Multilevel estimates for interactions among psychological conditions

	Physical JE				Cognitive JE				Emotional JE			
	Estimate	SE	t	R^2	Estimate	SE	t	R^2	Estimate	SE	t	R^2
Intercept	3.66***	0.06	60.77		3.76***	0.06	65.89		3.53***	0.06	59.98	
Baseline DV	0.71**	0.04	15.85		0.60***	0.05	11.83		0.74***	0.04	19.73	
Daily meaningfulness	0.47***	0.04	12.19		0.45***	0.04	11.12		0.53***	0.03	15.52	
Daily safety	-0.06	0.04	-1.58		0.03	0.04	0.82		0.08**	0.03	2.74	
Daily availability	0.23***	0.05	4.61		0.31***	0.05	6.19		0.24***	0.04	6.53	
Daily meaningfulness X safety	0.06	0.04	1.49		0.06	0.05	1.16		0.01	0.02	0.43	
Daily meaningfulness X availability	0.02	0.03	0.80		-0.02	0.03	-0.74		0.02	0.02	0.86	
Daily safety X availability	-0.01	0.05	-0.25		-0.05	0.05	-0.92		-0.01	0.04	-0.39	
Three-way interactions	-0.05	0.03	-1.82		-0.05	0.04	-1.42		-0.03	0.02	-1.89	
Level 1 Variance				42%				40%				54%
Level 2 Variance				56%				48%				65%

Note. N=1487 occasions at level-1, N=307 participants at level-2. *p* <.05, **p* <.01, ***p* < .001

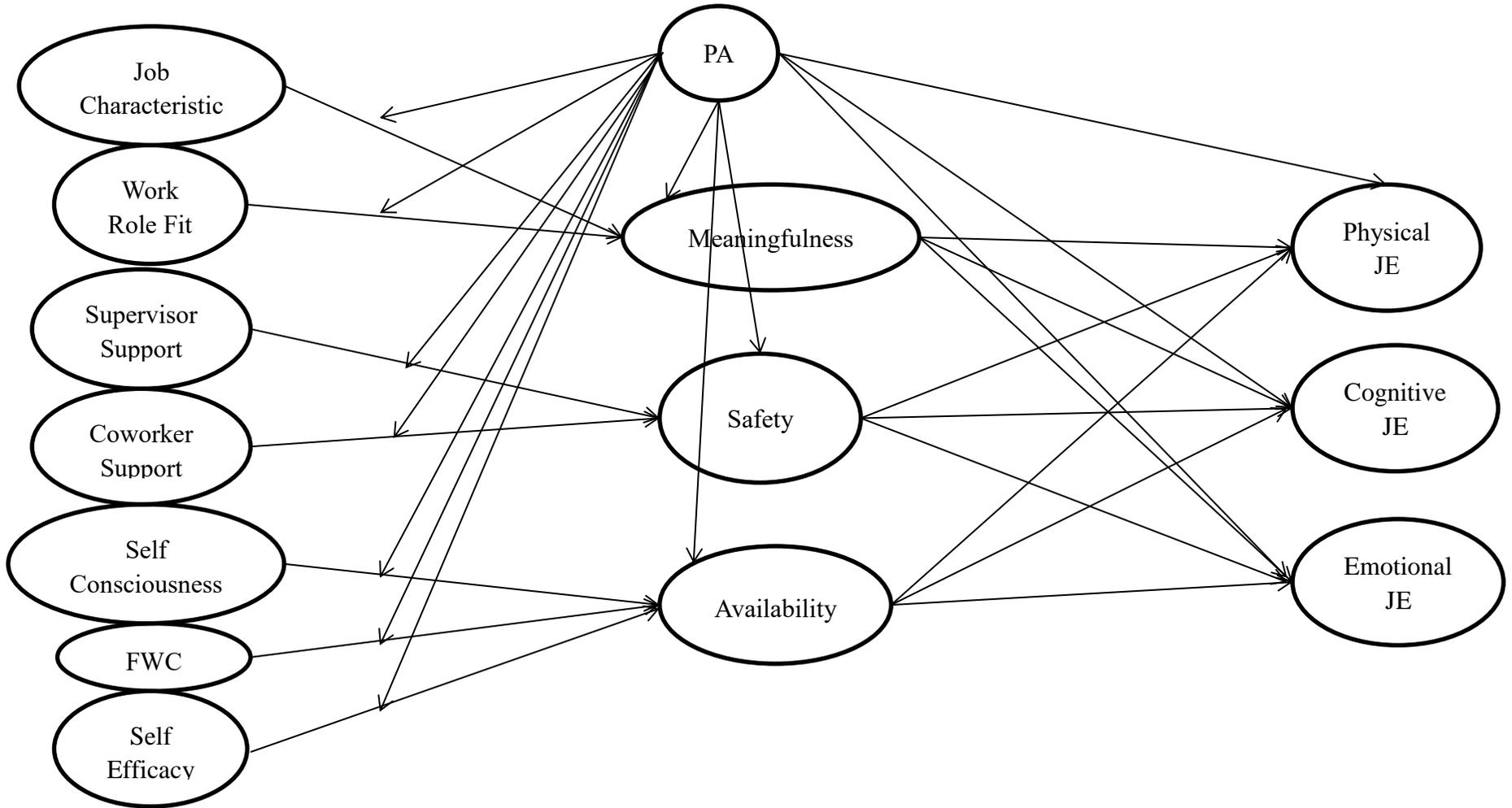Figure 1 Hypothesized model of job engagement

Figure 2 The final SEM model of relationships among predictors, psychological conditions, and JEs
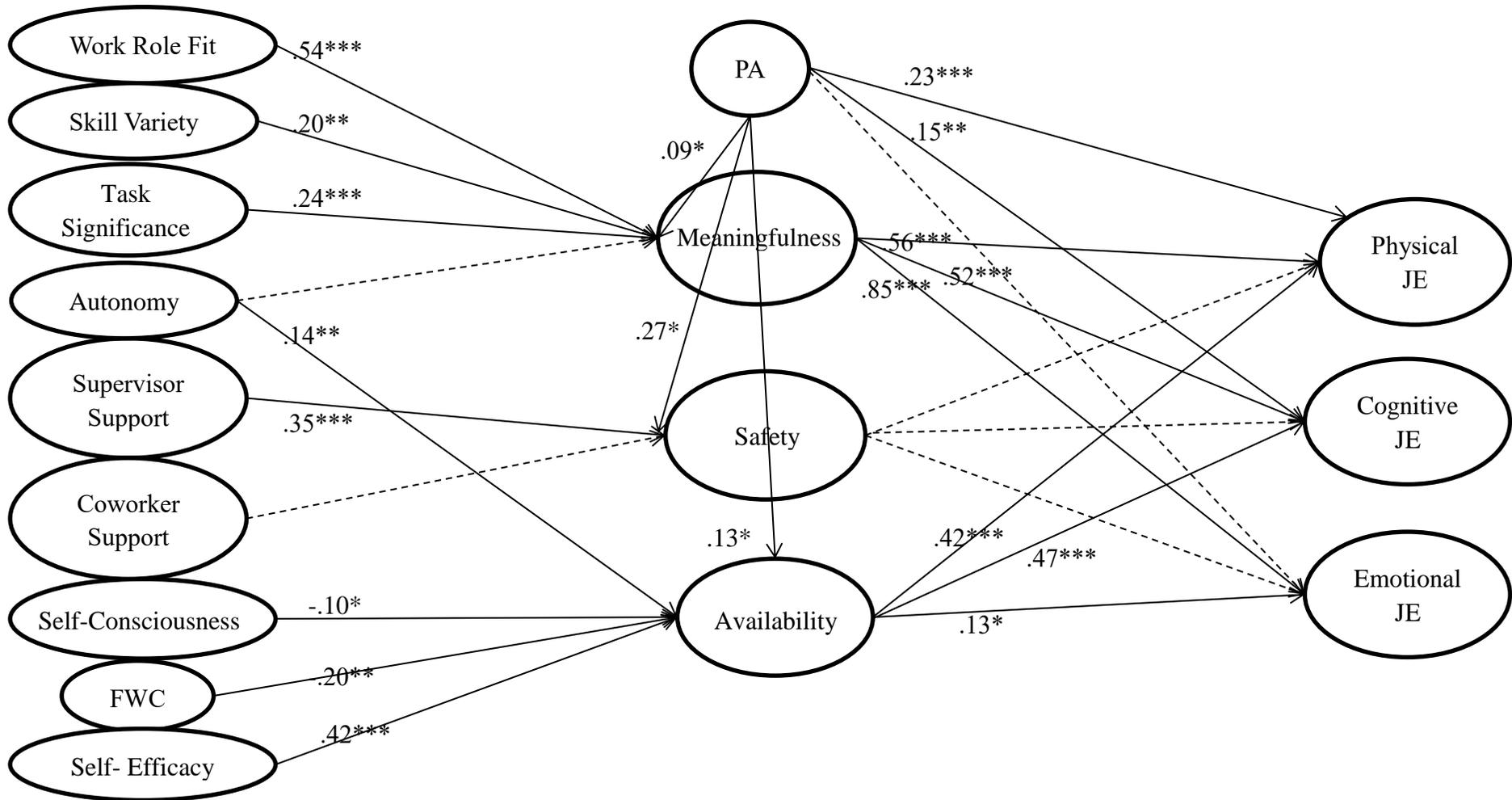
Figure 3 Moderating effect of PA on the relationship between coworker support and safety
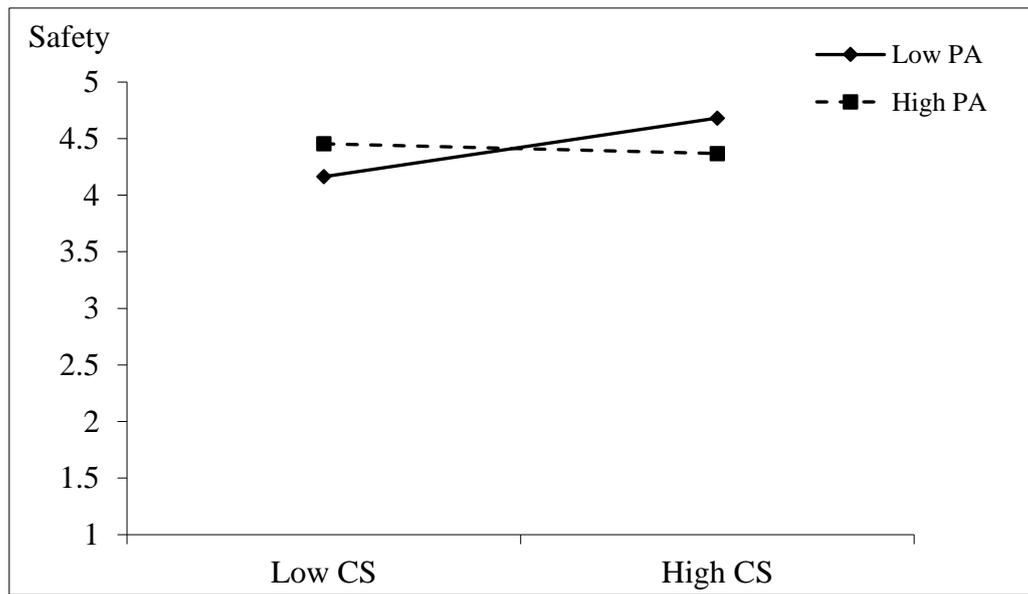
Figure 4 Moderating effect of PA on the relationship between supervisor support and availability
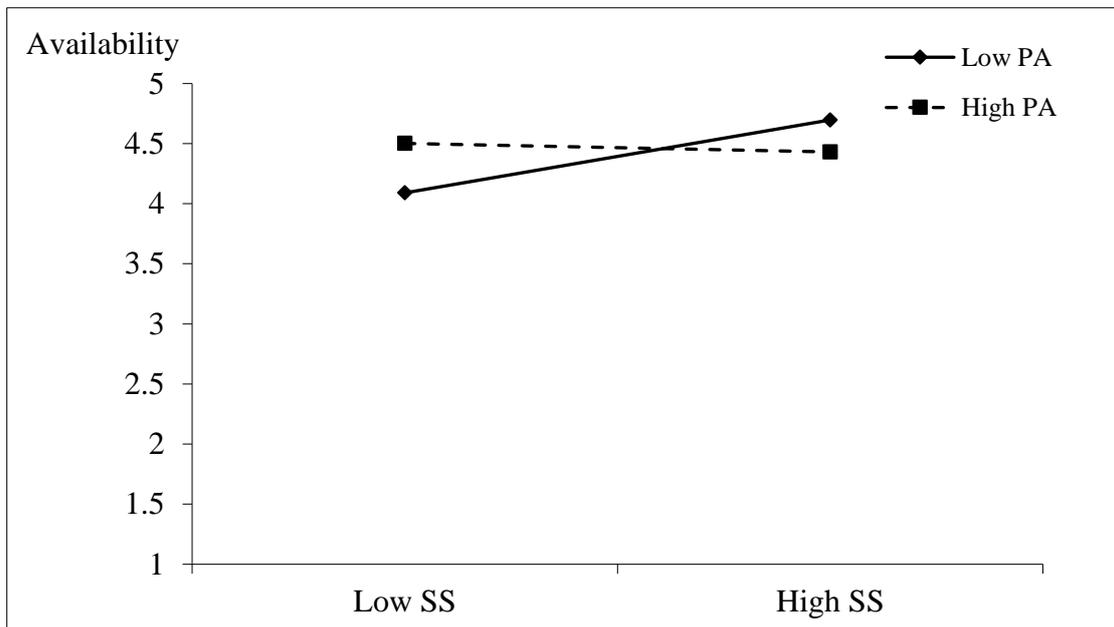
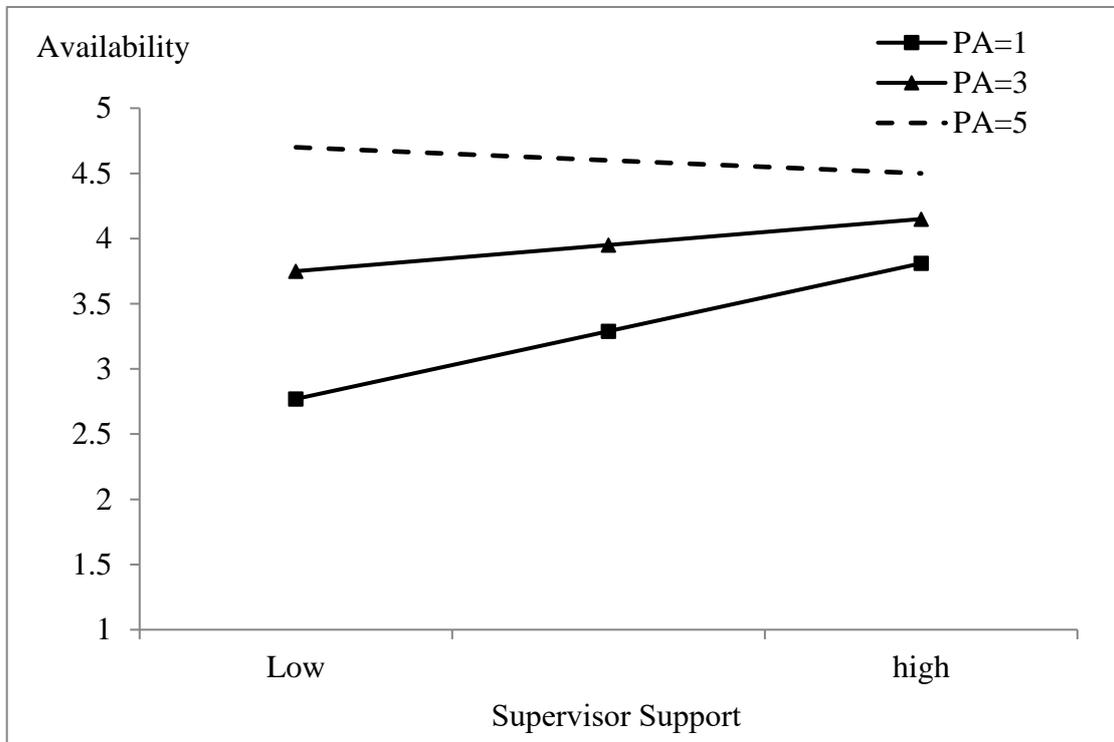Figure 5 Multi-level moderating effect of PA on the day-level supervisor support-availability relationship
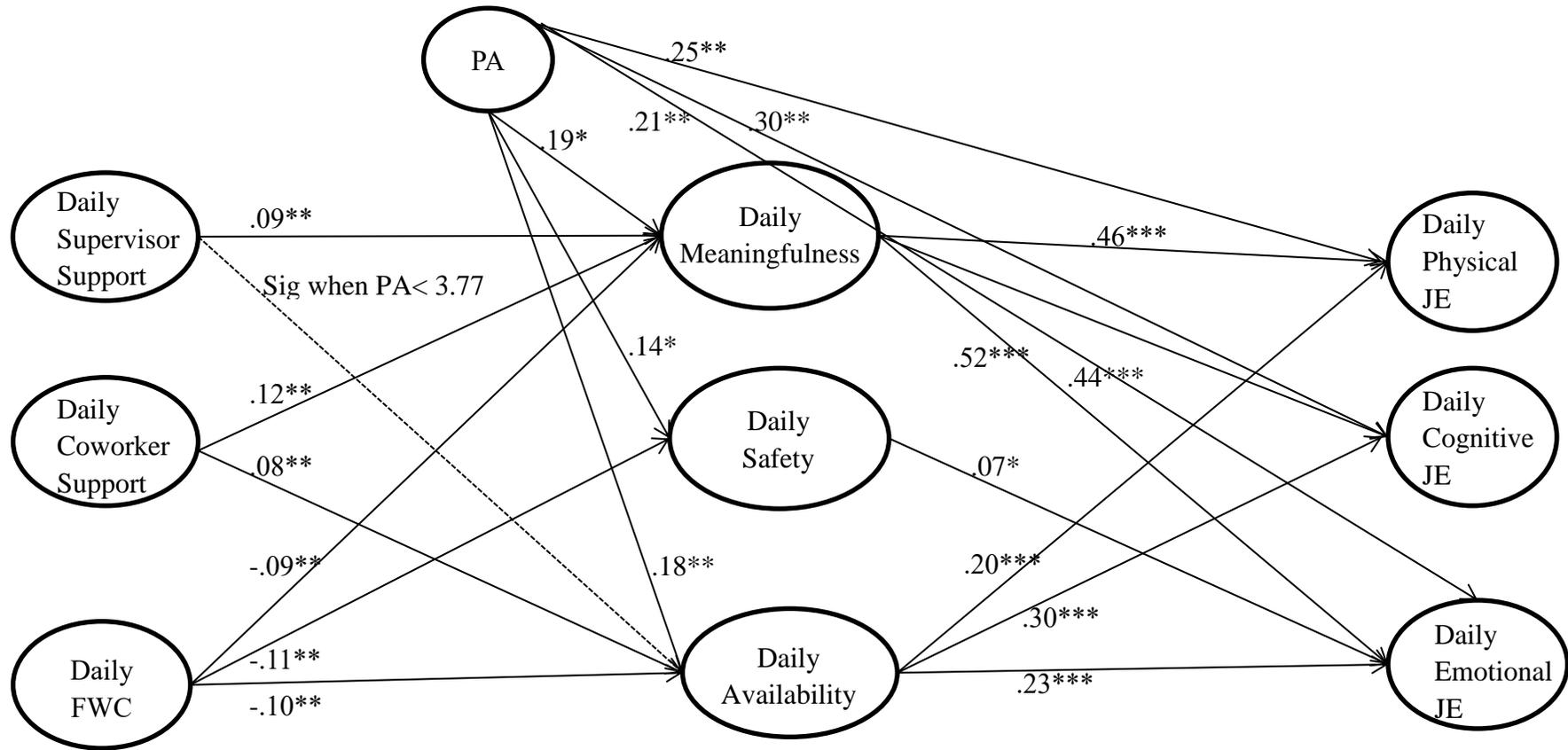
Figure 6 Summary of the mediation and moderation effects among the day-level variables

Appendix

Baseline Survey Measures
5-point likert scale, from 1 = strongly disagree to 5 = strongly agree.

Please indicate the extent to which each of the following statements describes your GENERAL experience in your current job.

Psychological meaningfulness
1. The work I do on this job is very important to me.
2. My job activities are personally meaningful to me.
3. The work I do on this job is worthwhile.

Psychological safety
1. I'm not afraid to be myself at work.
2. I am afraid to express my opinion at work (r).
3. There is a threatening environment at work (r).

Psychological availability
1. I am confident that I can handle the physical demands at work.
2. I am confident in my ability to think clearly at work.
3. I am confident in my ability to display the appropriate emotions at work.

Job engagement
Physical
1. I work with intensity on my job.
2. I devote a lot of energy to my job.
3. I strive as hard as I can to complete my job.
Cognitive
1. At work, my mind is focused on my job.
2. At work, I pay a lot of attention to my job.
3. At work, I am absorbed in my job.
Emotional
1. I am interested in my job.
2. I am proud of my job.
3. I am excited about my job.

Please indicate the extent to which each of the following statements describes your job.

Job Characteristics
Skill Variety
1. The job allows me to use a variety of skills and talents.

2. The job requires me to use a number of complex or high-level skills.

3. The job is quite simple and repetitive. (r)

Task Significance

1. Results of my work are likely to significantly affect the lives or well-being of other people.

2. This job is one in which a lot of people can be affected by how well the work gets done.

3. The job itself is not very significant or important in the broader scheme of things. (r)

Autonomy

1. My job permits me to decide on my own how to go about doing my work.

2. The job gives me considerable opportunity for independence and freedom in how I do the work.

3. The job denies me any chance to use my personal initiative or judgement in carrying out the work. (r)

Work role fit

1. My job "fits" how I see myself.

2. I like the identity my job gives me.

3. The work I do on this job helps me satisfy who I am.

Please indicate the extent to which each of the following statements describes the personal interactions in your job.

Self- Consciousness

1. I worry about how others perceive me at work.

2. I am afraid my failings will be noticed by others.

3. I don't worry about being judged by others at work. (r)

Supervisor support

1. My supervisor showed that they appreciated the way I do my work

2. My supervisor gave me advice on how to handle things

3. My supervisor helped me with a given task

Coworker support

1. My coworkers showed that they appreciated the way I do my work

2. My coworkers gave me advice on how to handle things

3. My coworkers helped me with a given task

Please indicate the extent to which each of the following statements describes your family life and job.

Family to work conflict

1. Family demands make it difficult for me to have the work schedule I want.

2. Things going on in my family life make it hard for me to concentrate at work.

3. Because of the demands I face at home, I am tired at work.
4. My family life puts me into a bad mood at work.

Please indicate the extent to which each of the following adjectives and statements describes you in general.

Positive Affectivity
1. interested
2. attentive
3. excited
4. enthusiastic
5. proud
6. determined
7. strong
8. active

Self-efficacy
1. I will be able to achieve most of the goals that I have set for myself.
2. I believe I can succeed at most any endeavor to which I set my mind.
3. I am confident that I can perform effectively on many different tasks.

Demographic
1. What is your gender?
2. What is your age?
3. What is your job industry?
4. Which range best describes your total income every year?
5. Please indicate the highest grade or year of school that you have completed.

Daily Survey Measures
Please fill out this survey based on what happened **TODAY**

Please indicate the extent to which each of   the following statements describes your job experience or feelings TODAY

Psychological meaningfulness
1. The work I did today on this job is very important to me.
2. My job activities today were personally meaningful to me.
3. The work I did today on this job is worthwhile.

Psychological safety
1. I was NOT afraid to be myself at work.
2. I was afraid to express my opinion at work.
3. There was a threatening environment at work.

Psychological availability
1. I was confident that I could handle the physical demands at work.
2. I was confident in my ability to think clearly at work.
3. I was confident in my ability to display the appropriate emotions at work.

Physical engagement
1. I worked with intensity on my job.
2. I devoted a lot of energy to my job.
3. I strived as hard as I can to complete my job.

Cognitive engagement
1. At work, my mind was focused on my job.
2. At work, I paid a lot of attention to my job.
3. At work, I was absorbed in my job.

Emotional engagement
1. I was interested in my job.
2. I was proud of my job.
3. I was excited about my job.

Please indicate the extent to which each of the following statements describes your personal relationships at work or family life <u>TODAY</u>:

Supervisor support
1. My supervisor showed that he/she appreciated the way I did my work.
2. My supervisor gave me advice on how to handle things.
3. My supervisor helped me with a given task.

Coworker support
1. My coworkers showed that they appreciated the way I did my work.
2. My coworkers gave me advice on how to handle things.
3. My coworkers helped me with a given task.

FWC
1. Family demands made it difficult for me to have the work schedule I want.
2. Things going on in my family life made it hard for me to concentrate at work.
3. Because of the demands I faced at home, I was tired at work.
4. My family life put me into a bad mood at work.