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Does playful work design 'lead to' more creativity? A diary study on the role of flow

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ABSTRACT

Playful work design refers to the process through which employees proactively create conditions within work activities that foster enjoyment and challenge without changing the design of the job itself. Using flow theory, we propose that employees experience more work-related flow (work enjoyment, work absorption, and intrinsic work motivation) on the days when they playfully design their work – with positive implications for creative performance on these days. In addition, based on trait activation theory, we hypothesize that flow proneness strengthens the relationship of playful work design with work-related flow. A daily diary approach was employed to test the hypotheses. In total, 149 participants completed both baseline and daily questionnaires across five consecutive working days (total $N = 552$). Alternative Uses Task was used to measure objective creativity at work. Multilevel analysis showed that playful work design was positively associated with work-related flow, and work-related flow was significantly related to creativity – on a daily basis. In addition, employees high (*vs.* low) in flow proneness reported more flow and creativity when playfully designing their work. We discuss the theoretical and practical implications of these findings.

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Alternative uses task; creativity; flow proneness; playful work design; work-related flow

Creativity is one of the essential resources that organizations strive for to stay ahead in the competitive business world. Creative employees have become imperative for organizations because they are likely to produce valuable and innovative ideas (Amabile et al., 2005). Correspondingly, there is consistent scholarly attention on improving creativity at work (Bakker, Petrou et al., 2020; Scharp et al., 2019; Schutte & Malouff, 2020). Recent studies have indicated that when employees make their job fun and enjoyable (Petelczyc et al., 2018), they tend to be more creative. Consistent with these insights, multinational companies like Google enable their engineers to do their work in a fun and playful way – for example, they may "design their own desks or work stations out of what resemble oversize Tinker Toys" (Stewart, 2013).

Although previous studies have demonstrated that individuals may become more creative when they play at work (Bateson et al., 2013; Fluegge-Woolf, 2014), in the current study, we will focus on a different perspective, namely the *creation* of play during work and its association with creativity. A recently emerging concept related to this field that has attracted attention is playful work design (PWD; Scharp et al., 2019). PWD refers to the process through which employees *proactively* create conditions that foster enjoyment and challenge without changing the design of the job itself (Bakker, Hetland et al., 2020). For instance, employees may set challenges (i.e., time records, deadlines) within a job task and try to compete with themselves in order to facilitate productivity. Employees may also share jokes to make the conversation more enjoyable during a meeting. A comparable construct is job crafting, which refers to the proactive expansion and contraction of the scope of the job (e.g., job demands and resources; Rudolph et al., 2017); PWD is different from job crafting as PWD mainly refers to reframing the work process and/or experience without changing the boundary of the job (cf., Bakker, Hetland et al., 2020). We will elaborate on this below.

It is essential to establish how *proactive creation* of play or challenge rather than play at work may influence creativity, so that employees can understand how to manage their own experience of work and foster creativity. Even though various antecedents of creativity have been documented, including mood (Friedman et al., 2007), thinking style (Lewis & Lovatt, 2013), and personal resources (Bakker, Petrou et al., 2020), many of these antecedents are static or more passive in nature, which means they are largely out of control by employees themselves (e.g., at least in the short-run). Thus, previous creativity research has largely neglected the possibility that employees could also redesign their job tasks and change their experiences to increase the likelihood to be more creative (Scharp et al., 2019).

In the current study, drawing on flow theory (Bakker & Van Woerkom, 2017), we argue that when employees playfully design their work, they will become more creative because PWD induces more flow experiences. Flow is a state of mind characterized by three main elements, work enjoyment, absorption, and intrinsic work motivation (Bakker, 2008). Absorption refers to the complete concentration and immersion at work, which is one of the hallmarks of flow (Csikszentmihalyi, 2020). Work enjoyment relates to the

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positive affect and fulfilment generated from work-related activities. Intrinsic motivation describes the states in which employees are eager to achieve their work-related goals and purposes (Moneta, 2004). When employees add more fun/challenges to existing tasks, they likely trigger such positive experiences because skill-challenge balance is a crucial antecedent of flow (Csikszentmihalyi, 1997).

Further, prior studies have established that individual differences exist in the frequency and intensity of experiencing flow (Ullén et al., 2012). Drawn on trait activation theory (Tett & Guterman, 2000), we argue that individual difference in flow proneness is likely to influence the effectiveness of daily playful work design on flow. The expression of flow proneness depends on the relevance and strength of situational cues (Ullén et al., 2012). Although PWD can be expected to create such cues (i.e., fun and challenge) and enhance the probability of experiencing flow, this may be particularly true for individuals with higher flow proneness because these people tend to experience flow more frequently and show a stronger inclination to enter flow.

Finally, extant evidence on playful work design and creativity is primarily based on subjective measures (Bakker, Scharp et al., 2020; Scharp et al., 2019). Its association with more objective measures of creativity remains largely unknown in the literature. Subjective measures are informative but may also generate common method bias, which may distort findings and implications to some extent (Podsakoff & Organ, 1986). In the current study, participants provided self-reports as well as conducted *objective* tests. Specifically, we tested daily creativity using the Alternative Uses Task (AUT; Dow, 2020), which measures fluency, flexibility, originality, and elaboration. Another methodological asset of the present study is that we assessed playful work design, work-related flow, and creativity at a *within-person* level using a daily diary approach (Monday–Friday; Larson & Csikszentmihalyi, 2014). As work is becoming more dynamic and employees' states likely change from day to day, the literature requires a micro-level approach that focuses on intra-individual fluctuations.

The present study makes several theoretical and methodological contributions. First, we provide insight into the mechanisms by which PWD may be positively associated with creativity. Although Scharp et al. (2019) have shown that work engagement mediates the effect of PWD on creativity, work-related flow is a conceptually related but fundamentally different concept compared to work engagement (Farina et al., 2018; Gerpott et al., 2022). Also, previous studies have suggested that PWD may be linked to flow theoretically (Bakker & Van Woerkom, 2017), to the best of our knowledge this has not been directly empirically tested before. Therefore, testing the indirect role of work-related flow would provide a novel contribution to insights into the mechanism involved in the association between PWD and creativity. Moreover, in line with the self-determination model of flow (Bakker & Van Woerkom, 2017), we establish preliminary empirical evidence regarding what actual behavioural strategies people can use to facilitate flow.

Second, previous studies have indicated that play-related activity and flow may foster creativity at work (Petelczyc et al., 2018; Scharp et al., 2019), but the majority of these studies have focused on subjective measurements (e.g., self- or other-reports). By employing a computerized task (AUT) as well as a quantitative diary research design, we provide more solid and reliable knowledge regarding employee's creative performance. This is relevant because in studies only using subjective (self-report) measures there might be potential common method bias (Podsakoff & Organ, 1986). Also, our daily diary approach focusing on a within-person level expands the prior literature on creativity which primarily used cross-sectional and longitudinal design (Lewis & Lovatt, 2013; Silvia et al., 2014).

Third, taking into account flow proneness enriches the trait activation literature (Tett & Guterman, 2000) and sheds light on the boundary conditions under which PWD is most effective in triggering flow and creativity. The literature has already indicated the moderating role of playfulness and openness (Scharp et al., 2019), but we add to this by examining how flow proneness (a construct referring to the tendency and frequency of flow experience, cf., Ullén et al., 2012) may moderate the effect of PWD on flow.

Theoretical background

Playful work design

Playful work design (PWD) is defined as the process through which employees proactively create work conditions that produce play and challenge without changing the design of the job itself (Scharp et al., 2019). One of the tenets that the conceptualization of PWD is based upon is play at work. Play at work refers to the activities carried out for fun and amusement, involves an enthusiastic attitude, and creates highly interactive environment (Petelczyc et al., 2018). It is human nature to pursue play, and once enacted, it will greatly facilitate intrinsic motivation, creativity, and wellbeing (Csikszentmihalyi, 2020). For example, employees may play Ping-Pong together during a short work break; employees "design their own desks or work stations out of what resemble oversize Tinker Toys" (Stewart, 2013).

Playful work design, on the other hand, is different from play at work as PWD focuses on changing the work experience (i.e., more fun and challenging). Designing fun can be seen as ludic play, characterized by humour, excitement, and entertainment, which relates to one's pleasure at work (Barnett, 2007). Individuals could increase fun and enjoyment at work by engaging in ludic play. The second cluster, designing competition, is agonistic play, which is concerned with efforts, goals, and purpose, serving to make a task more challenging, thereby bringing more excitement (and less boredom; Caillois, 2001). Employees could make the existing job tasks more challenging by referring to agonistic play. For instance, employees may set challenges (i.e., time records, deadlines) within a job task and try to compete with themselves in order to facilitate productivity; a postal carrier who sets a goal on how fast to deliver a parcel; or an officer who makes a meeting more fun by using wit and humour.

PWD derives from the intersection between play and proactive behaviour (Bakker, Scharp et al., 2020). Proactive behaviour refers to anticipatory and self-initiated action aimed at changing the situation or oneself (Parker & Collins, 2010). PWD may

be considered a subcategory of the broader concept of proactive person-environment fit behaviour (Parker & Collins, 2010). What differentiates PWD from the other types of proactive behaviours (e.g., voicing, taking charge) is that PWD specifically focuses on the actions that foster play and/or competition at work. Proactive behaviour may function as increasing job resources by seeking social support, regulating vitality (Bakker, Petrou et al., 2020), developing skills (Parker & Collins, 2010); but PWD, although self-initiated, emphasizes the strategy that individuals likely use to improve the work experience, in particular play and challenge, on existing tasks. PWD mainly refers to competing with oneself (e.g., breaking a personal time record), and not about competing with others (Scharp et al., 2019), thereby increasing excitement and enthusiasm for a task.

A concept that is closely related to PWD is job crafting (Bakker, Hetland et al., 2020). Although PWD and job crafting can be both considered as proactive behaviours (Bakker & Van Woerkom, 2017), they emphasize different aspects of work that employees may change. Job crafting refers to the "physical and cognitive changes individuals make in the task or relational boundaries of their work" (Wrzesniewski & Dutton, 2001, p. 179). It mainly refers to the behavioural or cognitive strategies aimed at changing job demands and resources (i.e., the boundary of tasks; Rudolph et al., 2017). Although PWD sometimes involves proactive changes in cognition (e.g., reframing a boring situation to experience more fun), which partly overlaps with cognitive job crafting (Bakker, Hetland et al., 2020). PWD is mainly related to proactively changing the experience of prevailing work activities by redesigning these activities to be more pleasurable or more challenging. In addition, PWD may be different from behavioural job crafting as the latter entails a broader concept that involves feedback-seeking, getting social support, etc.

PWD and work-related flow

When people approach their tasks in a fun and playful manner, they are more likely to be immersed and absorbed. Flow is a peak experience during which individuals feel totally immersed and motivated, accompanied by limited self-awareness and a feeling of complete control (Csikszentmihalyi, 2020). Flow can occur during work or leisure time (Csikszentmihalyi & Judith, 1989). Bakker (2008) characterized flow at work by three essential elements: work enjoyment (happiness during flow), work absorption (being fully concentrated on the task at hand), and intrinsic work motivation (perform job tasks for the tasks' own sake rather than for extrinsic rewards).

According to the self-determination model of flow (Bakker & Van Woerkom, 2017), employees have a stronger tendency to enter flow when using proactive strategies such as playful work design. When PWD is enacted, it can help employees better satisfy basic psychological needs for competence and relatedness (Scharp et al., 2022). For example, when an employee makes the job tasks more challenging, their skills are matched with difficulties of the task, which in turn facilitates the flow experience. On the days when individuals playfully design their work, they are more likely to experience work-related flow for several reasons. First, when people approach their tasks in a fun and playful manner, they are more likely to be immersed in their tasks and feel absorbed. Fun tasks are more intriguing and rewarding to employees and may help them acquire personal resources (Petelczyc et al., 2018). Second, approaching a task in a playful manner implies that individuals may enjoy the task to a greater extent, thereby producing more positive affect and enjoyment (Fluegge-Woolf, 2014). For example, a conversation that is fuelled by humour and wit will increase the intimacy between employees and satisfy their needs for relatedness. Third, setting challenges may also energize and motivate a person. People tend to be intrinsically motivated when they engage in optimally challenging tasks (Csikszentmihalyi & Judith, 1989). Such skill-challenge balance is assumed to be a crucial antecedent of flow (Fong et al., 2015). The challenging tasks may also help employees satisfy the psychological need for competence (Scharp et al., 2022).

Empirical support has been documented regarding the association between PWD and flow-like experience. From qualitative studies, Csikszentmihalyi (1997) showed that when individuals played or approached activities as a game, they were more likely to enter flow because they became more intrinsically motivated. Among an extensive collection of interviews with talented and ingenious people, Csikszentmihalyi and Judith (1989) proposed that people experienced their "highlight" moments when they felt playful and undertook tasks that were challenging. Using a daily diary study, Scharp et al. (2019) showed that employees have more work engagement (a construct conceptualized related to work-related flow) on the days when they playfully design their work, and score higher on self-reports of creativity. Bakker, Petrou et al. (2020) have shown that PWD helps satisfy basic psychological needs for autonomy, competence, and relatedness, which in turn facilitates job performance.

Hypothesis 1: Daily playful work design is positively associated with daily work-related flow.

The mediating role of flow

Creativity at work refers to the extent to which employees can tackle challenges and realize work-related goals by raising and implementing innovative and useful ideas (Amabile et al., 2005). Creative ideas are relatively difficult to produce and even more challenging to implement because they require considerable energetic, affective, and motivational resources (Bakker, Petrou et al., 2020). For example, people can generate innovative ideas quickly when in a positive mood, but selecting the most useful one among a group of loosely connected ideas requires consistent and persistent efforts.

By playfully designing their work, employees make their job tasks more fun and interesting, allowing them to feel more enthusiastic about ongoing tasks. On the specific days when employees design their work to be more playful, they increase the likelihood of flow since the tasks become more challenging and more motivating (Scharp et al., 2019). According to Bakker (2008), one of the core dimensions of flow is enjoyment, which is conceptually linked to positive affect. According to broaden-and-build theory (Fredrickson, 2001), when people have more

positive affect, they tend to have a broader thinking and behavioural repertoire and develop a flexible thinking style, because positive affect broadens the scope of attention (the number of cognitive elements available) and the scope of action. This heightened cognitive flexibility may help generate more ideas and raise new solutions (Little et al., 2011). In addition, individuals are often intrinsically motivated when experiencing flow, which likely increases the mobilization of attentional resources and persistence to tackle a problem (Bakker, Petrou et al., 2020). The higher level of motivation induced by flow implies that employees are more likely to accumulate a variety of creative ideas because they keep thinking on one problem (Moneta, 2004).

Previous literature has shown that flow is associated with creativity (Bakker, Scharp et al., 2020; Csikszentmihalyi, 2020; Madrid & Patterson, 2018; Scharp et al., 2019). For example, Csikszentmihalyi (2020) revealed that artists in the art and music fields reported a higher level of creativity when experiencing flow. Also, Madrid and Patterson (2018) found that positive affect brought more relevant associations to mind when dealing with materials that required divergent thinking and remote associates. In a series of experiments, Isen et al. (1987) found that induced positive affect facilitated performance on word associations and ingenuity tests. In their diary study, Scharp et al. (2019) found that daily PWD increased work engagement, which in turn, fostered self-reported daily creativity.

Hypothesis 2: Daily PWD is indirectly positively associated with daily creativity through daily work-related flow.

The moderating role of flow proneness

Traits, defined as a tendency to display a specific set of behaviours over different contexts and situations, differ from states, which reflect one's transient mood and behaviour (Van der Linden et al., 2007). Trait activation theory (Tett & Guterman, 2000) bridges the link between traits and states by specifying that the interactions between trait and situational cues are the primary forces underlying individual differences and varying states. For example, even kind-hearted people behave aggressively in war, but aggressive people still tend to show more hostility when in a friendly environment. Using trait activation theory in the work context, Tett and Burnett (2003) argued that trait-relevant cues would influence, to a varying degree, employees' working states depending on the connection (i.e., strength and intensity) between situational cues and traits.

Drawing from trait activation theory, we argue that PWD is likely to create cues that benefit work-related flow. Still, individuals may have different reactions to PWD due to their different inclinations to flow. Flow proneness refers to individual differences in the frequency and intensity of experiencing flow in daily lives (Ullén et al., 2012). In a similar vein, Csikszentmihalyi (2020) introduced autotelic personality (i.e., personal attributes) that reflects the individual tendency to experience flow. Individuals with an autotelic personality (e.g., curiosity, intrinsic motivation, enjoyment of challenge) are more prone to flow (i.e., virtually in every activity) in the manifestation of greater flow experiences than others under certain circumstances (Tse et al., 2021). When there are cues (i.e., challenge) that are inducive to flow, flow proneness (trait-like) may be more easily to be activated and translated into flow experiences. Tse et al. (2018) have shown that flow proneness moderated the effect of task challenge on flow states. Espedido and Searle (2020) have shown that behavioural activation moderates the effect of previous day's positive behaviour on next day's appraisals.

In the current study, we assume that PWD may create motivating cues, allowing the job tasks to be fun and challenging. Nevertheless, the cues introduced by PWD may be perceived differently by different individuals depending on the extent to which they tend to experience flow. This suggests that flow proneness may moderate the effects of PWD on flow. For example, individuals with high flow proneness are expected to be more susceptible to the cues created by PWD. This is because individuals with high (*vs*. low) flow proneness may need only minor changes in the design of work tasks to enable them to enter flow (Bakker, Scharp et al., 2020). As PWD indeed refers to small elements that are added to the existing tasks, it is postulated that the small changes will be used by the people who are high (*vs*. low) in flow proneness more efficiently. In contrast, individuals who are low in flow proneness may need stronger stimuli to enter a state of flow. Therefore, on days when employees use PWD, the positive associations between daily PWD and flow may be stronger for people with high flow proneness (see, Figure 1).

Hypothesis 3: Flow proneness moderates the indirect relationship between daily PWD and daily creativity through daily work-related flow. Specifically, the positive indirect link is stronger for people with high (*vs*. low) flow proneness.

Method

Procedure and participants

In this study, conducted in China, all participants were recruited via the internet using the WeChat application, which is a Chinese-based social media platform (similar to Whatsapp). The participants were approached using the author's personal network, (i.e., network sampling, a form of snowball sampling), which has the merits to increase the variety of jobs, individual and contextual characteristics (Demerouti & Rispens, 2014). Confidentiality was guaranteed and participants were required to have a full-time job and access to the questionnaires during the next working week. After being exposed to study introduction and invitation in WeChat Moments, there were 317 surveys submitted but only 192 participants completely finished the baseline questionnaire. Following registration, which allows participants to continue only if they answer check questions (e.g., the time when they receive the questionnaire, requirements upon completion) correctly, participants were asked to complete a baseline survey that collected demographic information (i.e., age, gender) and flow proneness. Then, daily questionnaires (Monday to Friday, sent at 3:00 pm each day) were administered to assess daily PWD, work-related flow, and self-

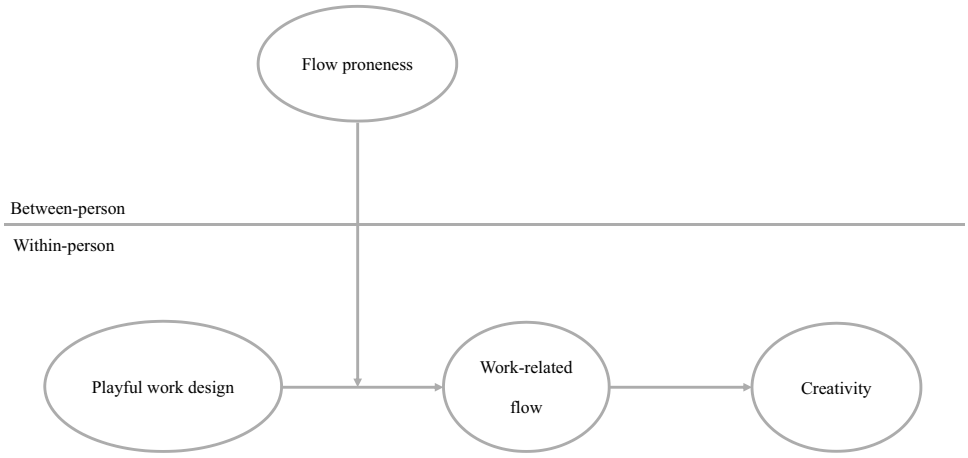

Figure 1. Proposed theoretical model.

reported creativity. A frequency check was used to identify the missing values and incomplete responses were excluded from further analyses. Within the five consecutive working days, 149 participants (response rate = 78.1%) continued to fill in the daily survey, resulting in 552 daily observations (response rate = 552/(149*5) = 74.1%) and 3,308 effective responses to indicate objective creativity from the Alternative Uses Task. Participants who fully participated were rewarded with 30 Chinese Yuan (3.83 Euros).

Among the 149 participants, 61 were male (40.9%). The sample age ranged from 19 to 56 (Mean = 30.15, *SD* = 7.46). In terms of marital status, 56.4% of the participants were single, married (28.2%), engaged (8.7%), divorced (1.3%), and others (5.4%). The vast majority of participants had a college/university or higher-level education (98.6%). The mean organizational tenure was 7.83 years (*SD* = 8.06). On average, they worked 8.55 hours (*SD* = 1.90) a day. Participants came from a variety of occupational backgrounds, ranging from Education and Training (19.5%), Manufacturing (10.1%), Information and Technology (9.4%) to Marketing and Sales (8.1%), etc.

Measures

Between-level measure

Flow proneness. Flow proneness was measured with the Swedish Flow Proneness Questionnaire (SFPQ; Ullén et al., 2012). This measure together with the following measures was translated and back-translated (Brislin, 1970). An example item is "How often does it happen that you feel completely concentrated?" (1 = *never*, 5 = *everyday*). The mean score on the seven items was used to indicate flow proneness. Cronbach's alpha for the work-related flow proneness was .73.

Within-level measures

A seven-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) was employed for all the daily measures.

Playful work design. Playful work design was measured using playful work design instrument (Scharp et al., 2019). The original version includes six items to assess designing fun and six items to assess designing competition. In the present study, to decrease potential demand on participants and increase the responsiveness of participants, we used three items for fun and three items for competition based on the relevance and reliability of the specific item. Examples are "Today, I looked for ways to make tasks more fun for everyone involved" (Designing Fun), and "Today, I tried to keep score in all kinds of work activities" (Designing Competition). The mean of all items was calculated to compute the overall PWD score. We used Lai's (2021) procedure to calculate reliability in terms of Omegas. Results showed that $\omega^{2l} = .90$, $\omega^{w} = .82$, $\omega^{b} = .83$, showing good reliability.

Work-related flow. Work-related flow was measured with Work-Related Flow Inventory (WOLF; Bakker, 2008). All of the original 13 items were used to measure work-related flow in the current study. Example items are "Today, I was totally immersed in my work" (Absorption); "Today, I felt happy during my work" (Enjoyment); and "Today, I got my motivation from the work itself, and not from the reward for it" (Intrinsic motivation). The mean of all items was used to represent work-related flow. Omegas for work-related flow were $\omega^{2l} = .94$, $\omega^{w} = .91$, $\omega^{b} = .81$, showing good reliability.

Subjective creativity. We measured subjective creativity at a daily level. Four items (Miron et al., 2004) were used to measure creativity during the day, one example item is "Today, I had a lot of creative ideas." The mean score was used to represent subjective daily creativity. Omegas for subjective creativity were $\omega^{2l} = .89$, $\omega^{w} = .82$, $\omega^{b} = .81$, showing good reliability.

Objective creativity. The Alternative Uses Task (AUT; Guilford, 1967) was employed as a more objective measure of creativity. The AUT asks individuals to think of as many uses as possible for a simple object (i.e., break, shoe). On each day (Monday-Friday), participants were presented with one of the following common objects: shoe, newspaper, paperclip, break, and cup. Participants were provided two minutes for each object. Four dimensions were evaluated by three experts in creativity field (see below the inter-rater reliability): fluency, flexibility, elaboration, and originality. *Fluency* refers to the absolute number of

answers. *Flexibility* refers to how many higher-level categories of functions are present. For example, the answer "ruler" and "measure the length of foot" were categorized to the same function as "measure something". *Elaboration* represents the extra detailed information that participants provide to each answer. For instance, a higher score was awarded for an answer "kick the locked door with great strengths" compared to "kick door". *Originality* refers to how novel and creative their ideas are.

AUT inter-rater reliability. After the test, identical scoring guidelines (Dow, 2020) were sent to three independent researchers in the creativity field to reconcile their understanding of the scoring system. Two of the researchers have international publications related to creativity, and one researcher is an expert who has evaluated AUT answers. Scoring was based on a five-point Likert scale (1 = *very low*, 5 = *very high*). Based on LeBreton and Senter (2008)'s recommendation, within-group interrater agreement (r_{WG}) and intra-class correlation (ICC; interrater agreement and interrater reliability) indices were used to justify the reliability and consistency among three raters. Results showed that fluency among the three scorers showed high reliability, r_{WG} = .89, Cronbach's Alpha = .90, ICC = .89 (N = 539, p < .001). For flexibility, r_{WG} = .79, Cronbach's Alpha = .82, ICC = .74 (N = 538, p < .001), indicating acceptable reliability. Scores on originality revealed a moderate reliability (r_{WG} = .73, Cronbach's Alpha = .73, ICC = .66, N = 538, p < .001); there was low agreement on elaboration (r_{WG} = .64, Cronbach's Alpha = .49, ICC = .33, N = 537, p < .001).

Statistical analysis

The data from repeated daily measures has a hierarchy structure as days (level-1) are nested within persons (level-2), indicating a multilevel analysis approach is appropriate. As some participants missed one or two days across the five consecutive days, the final response rate of the daily questionnaire was 74.1%. Missing data was dealt with using the default option by relying on Full Information Maximum Likelihood (FIML). Therefore, as long as the participants finish the daily questionnaire at least one time, we included their responses in the analyses. This method has the merit of making full use of the information available (Muthén & Muthén, 2017). We used Mplus (version 7.0, Muthén & Muthén, 2017) to conduct the following analysis.

First, a series of multilevel regressions was conducted to examine the relationship between PWD and work-related flow. Due to that the level of flow and creativity at day (t) may be influenced by the level on the previous day (t-$_1$) because of carry-over effects (Bakker, Scharp et al., 2020), we used a lagged approach (Oerlemans & Bakker, 2018). Specifically, after controlling for previous day's flow (lag), PWD was entered to predict flow on both level-1 and level-2,[1] and we obtained random slope (*aw*). Since Mplus has the power to automatically differentiate between within-person and between-person level variances and can examine the within-person effects under "% WITHIN%" context when using the "TWO-LEVEL" command, we did not conduct cluster-mean centring on level-1 variables (Muthén & Muthén, 2017). Note that the results stay virtually the same if we examine the within-person relationships after person-mean centring in MLwiN. Then, flow proneness (centred on the grand mean) was entered into the equation. To examine the cross-level interaction effect, we first estimated whether there were significant variances in random slope (*aw*), then, the random slope (*aw*) was regressed on flow proneness. Second, subjective creativity (during the day) as well as objective creativity were regressed on PWD and work-related flow on level-1 and level-2 after controlling for previous day's subjective and objective creativity. Since the score on elaboration showed poor reliability, we did not include it in these analyses. Third, in an overall model, objective creativity in terms of fluency, flexibility, and originality was respectively regressed on work-related flow after controlling for the previous day's score, and work-related flow regressed on PWD to test the indirect effect by following the procedure of Preacher et al. (2010). We used the default method "SYMMETRIC" for calculating the 95% CIs for the indirect effects. Specifically, we regressed work-related flow on PWD and obtained regressor (*a*), then creativity indicators (e.g., fluency) were regressed on work-related flow to calculate coefficients (*b-d*), then we multiplied *a* with *b* (*c, d*) to calculate the indirect effects.

Results

Descriptive statistics

Table 1 showed the means, standard deviations, intraclass correlations, and inter-correlations for the study variables. The intraclass correlation (ICC) revealed the proportion of level-2 variance compared to level-1 variance: playful work design (.54), work-related flow (.56), subjective creativity (.51), fluency (.50), flexibility (.46), originality (.43), elaboration (.21).

Table 1. Means, Standard Deviations, and Correlations Between Study Variables.

		Mean	*SD*	ICC	1	2	3	4	5	6	7	8
1	Flow proneness	3.38	.54	–								
2	Playful work design	4.09	1.21	.54	.287**		.772**	.602**	.116**	.122**	.083	.109*
3	Work-related flow	3.88	1.20	.56	.374**	.796**		.568**	.095*	.097*	.031	.074
4	Subjective Creativity	3.22	1.01	–	.290**	.595**	.499**		.124**	.138**	.088*	.098*
5	Fluency	2.60	.85	.50	.105	.078	.067	.112		.894**	.858**	.627**
6	Flexibility	2.62	.74	.46	.061	.110	.113	.152	.928**		.876**	.658**
7	Originality	3.00	.74	.43	.044	.082	.078	.142	.912**	.946**		.675**
8	Elaboration	2.78	.54	.21	−.019	.105	.055	.202*	.660**	.722**	.725**	

Note. Correlation above the diagonal are based on non-averaged data (level-1, N = 552); below the diagonal are level-2 (N = 149) correlations based on the average across days.
*p < .05. **p < .01

Multilevel confirmatory factor analysis

To examine the differential validity of the study variables, multilevel confirmatory factor analysis (MCFA) was conducted on the subjective measures, distinguishing three distinct factors (daily PWD, daily work-related flow, and daily creativity). Results showed a better fit to the data (χ^2 (433) = 726.216, $p < .001$, RMSEA = .035, CFI = .958, TLI = .951, SRMR = .055). More importantly, the three-factor model showed a better fit than the two-factor model ($\Delta\chi^2(4) = 388.491$, $p < .001$), and a much better fit compared to one-factor model ($\Delta\chi^2(6) = 677.171$, $p < .001$). These findings suggest that the three model variables can be empirically distinguished. Since we also investigated the associations between subdimensions of PWD and flow (see supplementary materials), multilevel confirmatory factor analysis (MCFA) was also conducted on the subjective measures to distinguish six distinct factors, including designing fun, designing competition, absorption, enjoyment, intrinsic motivation, and creativity. Results showed an excellent fit of the six-factor model (designing fun, designing competition, absorption, enjoyment, intrinsic motivation, and creativity) (χ^2 (430) = 682.108, $p < .001$, RMSEA = .033, CFI = .964, TLI = .957, $SRMR_{within}$ = .043, $SRMR_{between}$ = .060). These results clearly showed that the measurements were valid and the subconstructs could be empirically distinguished.

Hypothesis testing

Hypotheses 1 states that PWD is positively related to work-related flow at a within-person level. The results (see, Table 2) indeed showed that PWD was positively associated with work-related flow ($b = .581$, $SE = .042$, $p < .001$) after controlling for the lagged effect (previous day's flow, $b = -.183$, $SE = .045$, $p < .001$). We also tested whether the slopes regarding the effects of flow on PWD were random. Results showed that there was a better fit when we ran the model with random slope compared to fixed slope ($\Delta\chi^2(2) = 8.811$, $p < .05$), suggesting that there were significant variances in the within-person relationships between PWD and flow. These results confirm Hypothesis 1.

Hypothesis 2 states that PWD is positively related to 1) subjective and 2) objective creativity through work-related flow. Multilevel path results showed that PWD was indirectly related to daily subjective creativity through work-related flow ($b = .184$, $SE = .064$, $p = .004$, $CI_L = .018$, $CI_U = .350$).[2] Next, we used the AUT inter-rater scores (average score from the three experts) to test this indirect effect. Results showed that PWD was indirectly related to objective creativity via work-related flow in terms of fluency ($b = .049$, $SE = .018$, $p = .008$, $CI_L = .001$ $CI_U = .096$), showed a trend but did not reach the $p < .05$ level in predicting flexibility ($b = .029$, $SE = .017$, $p = .098$, $CI_L = -.016$, $CI_U = .074$), but not related to originality ($b = .003$, $SE = .017$, $p = .852$, $CI_L = -.041$, $CI_U = .047$). These results partly support Hypothesis 2.

Hypothesis 3 states that flow proneness strengthens the relationship between PWD and work-related flow. Cross-level moderation results (Table 2) showed that flow proneness moderated the effect of PWD on flow ($b = .087$, $SE = .043$, $p < .05$). Moreover, simple slope tests (Hox, 2010) revealed that the slope of PWD with work-related flow was stronger when flow proneness was high (1 *SD* above mean) ($b = .920$, $SE = .172$, $p < .001$) compared to when flow proneness was low (1 *SD* below mean) ($b = .828$, $SE = .128$, $p < .001$). The difference between the two slopes was also significant ($b = .093$, $SE = .046$, $p = .044$) (see, Figure 2). Thus, although PWD translated into flow for all employees, those who were prone to flow profited most from daily PWD. Finally, in an overall model (moderated mediation), PWD was indirectly related to daily creativity through work-related flow when flow proneness was high ($b = .299$, $SE = .057$, $p < .001$, $CI_L = .152$, $CI_U = .446$); but this effect was a little weaker when flow proneness was low ($b = .269$, $SE = .052$, $p < .001$, $CI_L = .134$, $CI_U = .404$). Also, results showed that PWD was indirectly positively related to fluency through flow. For high as well as low flow proneness, the indirect effect was significant (High: $b = .060$, $SE = .021$, $p = .004$, *CIL* = .019, *CIU* = .100; Low: $b = .053$, $SE = .019$, $p = .005$, CIL = .016, CIU = .090). Regarding flexibility, the indirect effect was not significant (High flow proneness: $b = .032$, $SE = .019$, $p = .094$, CIL = −.005, CIU = .070; Low flow proneness: $b = .029$, $SE = .017$, $p = .101$, CIL = −.006, CIU = .063). These results largely support Hypothesis 3.

Discussion

The central aim of the current study was to examine how daily playful work design is linked to daily work-related flow and, in turn, to daily creativity at a within-person level. We hypothesized that employees would experience more flow on days when they playfully redesign their tasks, and that flow would further heighten their creativity. Flow proneness was expected

Table 2. Work-Related Flow by Playful Work Design, Flow Proneness, and Cross-Level Interaction.

	Work-related flow			Subjective creativity			Fluency			Flexibility		
	Estimate	*SE*	*P*	Estimate	*SE*	*P*	Estimate	*SE*	*P*	Estimate	*SE*	*P*
Control variable												
Lag (previous day)	−.183	.045	***	−.210	.058	***	−.062	.009	***	−.039	.011	**
Level-1												
Playful work design (PWD)	.581	.042	***	.379	.093	***						
Work-related flow				.312	.093	**	.086	.031	**	.051	.029	.083
Level-2												
Flow proneness (FP)	−.035	.203										
Cross-level interaction												
PWD * FP	.087	.043	*									
Variances (level-1)	.573	.063	***	.392	.040	***	.323	.026	***	.282	.028	***
Variances (level-2)	.854	.121	***	.273	.103	**	.391	.052	***	.263	.039	***

Note. ***$p < .001$. *$p < .05$

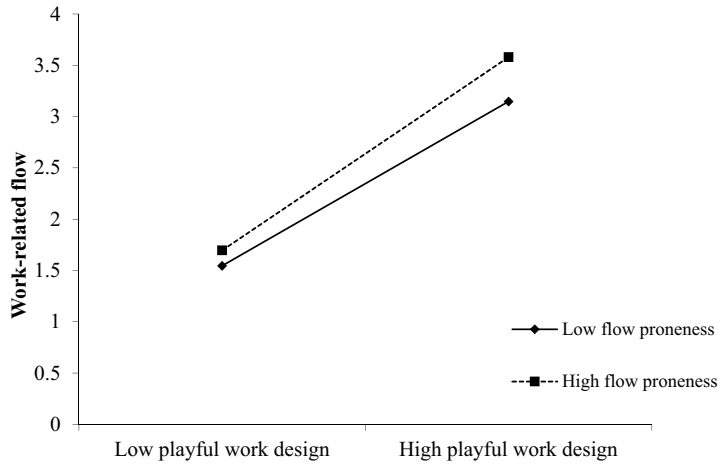

Figure 2. Cross-level Interaction Effect of Daily Playful Work Design and Trait Flow Proneness on Daily Work-related Flow.

to quantify this association because high flow-proneness individuals were more susceptible to flow cues. Using a quantitative daily diary design, results from multilevel analysis largely support these hypotheses.

The current study makes several theoretical contributions. First, the antecedents of (work-related) flow have been well documented in the literature, including job resources (Nielsen & Cleal, 2010), skill–challenge balance (Asakawa, 2004), personal resources (Demerouti et al., 2012), leadership (Zubair & Kamal, 2015), and personality (Ullén et al., 2012). Despite the extensive investigation on the antecedents of work-related flow, most studies have primarily focused on the environmental and situational factors or traits (i.e., flow proneness) facilitating flow, they largely ignored how individuals take charge of and change their external environment (Bakker & Van Woerkom, 2017). In other words, the prior studies mainly suggest that individuals "passively" respond to the environment, implying that they have little control over flow.

Recent literature, however, has indicated that individuals indeed change and influence their environment (Espedido & Searle, 2020; Scharp et al., 2019). For example, people can craft jobs proactively to make positive changes with respect to their work tasks in order to make them more suitable (Wrzesniewski & Dutton, 2001). Similarly, the present study showed that employees could increase work-related flow through playfully designing their work. This contributes to the proactivity literature by emphasizing the behaviours/strategies that people are able to utilize to foster flow. By slightly changing one's job tasks to increase experiential qualities of play on existing work without changing the actual core of the tasks, flow may be enhanced accordingly.

Second, the present study provides a methodological contribution to the literature because it focused on the within-person (daily level) relationship. Our results indicate that PWD indirectly increased creativity via work-related flow on a daily level. This implies that on the specific days when employees design their work playfully, they may also experience more flow and creativity. Although previous studies provide insights into individual differences in flow (or affect) and creativity (Madrid & Patterson, 2018; Schutte & Malouff, 2020), as well as within-person relationships (Silvia et al., 2014), they rarely addressed questions regarding the proactive behaviours that individuals may use to improve creativity. The current study using a within-person level research design responds to the research question what specific behaviour employees may use to enhance their own creativity on a daily basis. We provide evidence regarding what employees may utilize at work, namely PWD, as a proactive behavioural strategy to facilitate creativity *intra-individually*.

To the best of our knowledge, only one study has investigated the within-person effect of PWD on creativity, and found that PWD was positively related to work engagement, and in turn improved creativity on a daily basis (Scharp et al., 2019). Our results echoed their findings, but different from their perspective as we focused on *objective* creativity and also proposed the boundary conditions (flow proneness) under which PWD is most effective to influence daily flow. In addition, we used a different analytical approach by controlling for the previous day's flow and creativity, this may also provide more stringent results which complement Scharp et al.'s (2019) results. By employing the AUT (Dippo, 2013), our study decreased the risk of common method biases because we invited three researchers to give their independent evaluations of the participants' responses (also see supplements).

Results suggest that previous day's flow had a negative relationship with the level of flow during the current day, whereas previous day's creativity did not contribute to the current creativity. The reason why we found a negative lagged effect is unknown. Theoretically, it is conceivable that today's flow fosters tomorrow's flow due to carry-over or spill-over effects (Bakker, Scharp et al., 2020). However, it is also possible that flow consumes so many energetic resources (e.g., attention), that it results in a decreased level of concentration during the following period. We encourage future studies to assess the resource level (e.g., energy, vigour) after flow experience, and whether people experience sound recovery after flow.

Third, our study revealed that, compared to employees with low flow proneness, employees with high flow proneness reported a higher level of flow and creativity on the days when they designed their work playfully. In the literature, there is a long-standing debate with respect to whether situational factors or personal traits determine the trait expression process (Tett & Guterman, 2000). In an attempt to integrate

these opposed insights, Tett and Guterman (2000) proposed trait activation theory (TAT) by demonstrating that personality traits will be expressed when there are trait-relevant situational cues. By combining flow proneness and trait activation literature, we showed that PWD might play an essential role in the trait (flow) activation process. Specifically, PWD was shown to be able to activate the flow proneness trait by creating situational cues that change the relevance (e.g., a boring task becomes fun) or the strength of a situation (e.g., increase task difficulties). These findings add to the trait activation theory by showing that situational cues that are relevant to one's trait could be managed in a more proactive manner.

Practical implications

One of the main practical implications inspired by the current study is that employees should be encouraged to use PWD more frequently while at work. Two approaches may be applied. One is a top-down strategy, while the other is a bottom-up approach. A top-down strategy refers to the measures from an organizational stance. For example, employers can encourage their employees to design their work playfully and offer more support, such as knowledge, coaching, and professional consultation. Organizational support for PWD is expected to facilitate flow experiences because it enables employees to better design work activities and tasks with more fun and playfulness.

The bottom-up approach emphasizes the role of employees themselves. For example, employees may choose to use small but useful tricks to create more challenges within existing tasks (i.e., aiming to break time records); or use cognitive crafting such as imaging ways to conduct their work in a more fun manner (e.g., exchanging jokes with a customer; imagining the story of a passenger; Scharp et al., 2021). As such, employees can better meet their own specific needs such as relatedness and competence.

Limitations and future research

This study, of course, has its limitations. First, even though we tested subjective creativity on the same days that participants reported their levels of PWD and flow, objective creativity was tested between 3:00 pm and the end of work each day. It is possible that any introduced task (i.e., AUT) would literally interrupt employees' immersed states on job tasks, e.g., participants will not experience flow when conducting our AUT. Hence, the relationship between flow and objective creativity would be better not to be seen as simultaneous effect. That being said, the daily self-reported creativity was in accord with daily flow experiences, exactly reflecting the simultaneous relationship between flow and creativity, but the objective creativity might have the potential to only reflect the after-effects of flow, which acts as an important complement to the self-reported results. However, as we introduced AUT in the middle of their work (3:00 pm), flow experience on a daily level might produce positive affect, which enables the potential links between flow and AUT results (e.g., spill-over effects). Overall, due to the research design, it is conservative to note that the current results regarding objective creativity may shed lights on the more proximal effects of PWD and flow on creativity.

Another limitation is that our results could not test the direct causal relationships between the study variables. Even though we have controlled for the lagged effects (i.e., level of the previous day), it is still a leap to say that PWD could "lead to" flow as measured during the same period. But as objective creativity was measured after PWD and flow, it was more likely that PWD and flow would influence creativity, but not vice versa. Moreover, we tested several alternative models by reversing/changing the order of study variables. Results showed that the hypothesized model best fit the data (see supplements).

Finally, the current study did not include constructs such as job crafting, play at work, and work engagement. Therefore, we cannot directly examine the incremental validity of PWD. However, several other researchers have already rigorously investigated the incremental validity by establishing the uniquely predictive value of PWD in comparison to job crafting (cf., Bakker, Hetland et al., 2020; Scharp et al., 2022). Also, despite a reported positive correlation between PWD and work engagement (Scharp et al., 2022), as there is a conceptual difference between flow and engagement (Gerpott et al., 2022), it also makes sense to measure engagement and flow simultaneously and test the strength of association between PWD and these two constructs, which can help establish the difference between flow and engagement empirically.

These limitations point to several paths to investigate PWD in the future. Researchers may use a more micro approach such as focusing on a momentary or episodic-level to study the effects of PWD on flow experience because of the transient nature of flow. Flow tends to fluctuate not only from day to day, but also from work episode to work episode. It is meaningful to examine a more proximal relationship between PWD and flow by looking into the short-term association. Also, whether employees can incorporate playful design into their work may be partly determined by the characteristics of job tasks. For example, employees perhaps have more freedom to decide and design their job tasks during certain forms of tasks compared to others (i.e., individual task *vs*. collective task). This suggests that it is vital to take into account the characteristics of tasks when investigating the antecedents of PWD.

Finally, since PWD is a relatively new construct and conceptually intertwined with cognitive job crafting, future studies are encouraged to measure concepts related to PWD, such as job crafting and play at work, to further establish the incremental validity of PWD in addition to Bakker, Hetland et al. (2020) and Scharp et al. (2022). Besides, future researchers may also want to examine how organizational support for PWD may be linked to PWD. Environmental factors, such as social support and organizational climate, may also moderate the effect of daily PWD on flow. For example, if an institution values openness and playful work, they might be more tolerant with or even encourage their employees to use PWD behaviour. In this case, PWD will be more effective to foster wellbeing and performance. This group of moderators is interesting and calls for further empirical investigation.

When employees receive more support for designing their work playfully, will they benefit more from designing their work and thus experience more flow? Work support could be an

essential contextual resource that boosts the effects of positive work behaviours on wellbeing/performance, but this calls for further empirical investigation.

Conclusion

The current study showed that PWD was positively associated with flow experience and contributed to creativity. High flow proneness seemed to bolster the effect of PWD on flow (further on creativity). These results suggest that employees may proactively activate flow trait and create more experiences by playfully (re)designing their work. Their creative performance will also benefit from the flow states subsequently.

Notes

1. Following Preacher et al.'s (2010) and Antonakis et al.'s (2021) recommendations on multilevel modelling, even though we only focus on within-person (daily level) relationships between study variables in the current study, adding level-2 predictors (e.g., cluster mean) helps alleviate endogeneity problems between regressors and improve model fit, obtaining more consolidated results compared to the models without level-2 predictors.
2. CI_L and CI_U mean 95% confidential interval.

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