From work meaningfulness to playful work design: the role of epistemic curiosity and perceived Leader's autonomous support

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Abstract

Purpose – Building on the self-determination theory (SDT), the purpose of this study is to empirically examine the influence of work meaningfulness (WM) on employees' involvement in playful work design (PWD) in the context of software development firms in Pakistan.

Design/methodology/approach – For the present study, a two-wave employee survey (online questionnaire) was used for data collection. The data were collected through an adopted questionnaire from employees working in software development firms in Pakistan. structural equation modeling and Hayes Process Macro of SPSS were used to analyze data collected from 305 respondents.

Findings – The findings of this study show that work meaningfulness and epistemic curiosity (EC) positively and significantly influence employee playful work design strategies. Moreover, the relationship between work meaningfulness and playful work design was partially mediated by employee epistemic curiosity. This mediating role of epistemic curiosity is strengthened by the presence of the perceived leader's autonomous support (LAS).

Research limitations/implications – Employees improve their personal work experience through playful work design. Theoretically, this study contributes to the body of knowledge on the factors (work meaningfulness, epistemic curiosity and leader's autonomous support) that can influence employees' self-determination to design fun and competition into their work. This study contributes to the theory by introducing the antecedents (work meaningfulness and epistemic curiosity), of employee playful work design and explores the role of epistemic curiosity as a mediator and the leader's autonomous support as a moderator through SDT perspective.

Practical implications – For practitioners, this study pinpoints that software development firms can consider improving employees' perception of work meaningfulness, which can lead them to become epistemically curious to proactively design their work experience for their psychological need fulfillment, well-being and better functioning. Moreover, leader's autonomous support can support involvement in playful work design.

Originality/value – The current study is the first investigation in the Asian context to study the antecedents of playful work design and a critical boundary condition. This study extends the literature on the antecedents of employee playful work design and explores the role of epistemic curiosity as a mediator and the leader's autonomous support as a moderator specifically through a self-determination perspective.

Keywords Epistemic curiosity, Leader's autonomous support, Playful work design, Self-determination theory, Software development firms, Work meaningfulness

Paper type Research paper

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1. Introduction

Traditionally, work psychology has concentrated on job design, describing how employees adjust to diverse workplace aspects to complete their tasks (e.g. Hackman & Oldham, 1976; Morgeson, Garza, & Campion, 2013). However, little is understood about play as a proactive work strategy, despite the increasing scholarly attention on how employees manage their work proactively (Bakker & Leiter, 2017; Cai, Parker, Chen, & Lam, 2019; Parker, Bindl, & Strauss, 2010). Proactive behavior can include self-initiative, anticipatory action, taking charge, voicing concerns and feedback-seeking behavior (Vough, Bindl, & Parker, 2017). There is substantial evidence that such behaviors are linked to improved employee engagement, well-being, and performance outcomes (Bakker, Hetland, Olsen, Espevik, & De Vries, 2020; Parker & Bindl, 2016; Scharp, Bakker, & Breevaart, 2022). Playful work design (PWD) refers to a process where employees proactively design fun and competition in their work (Scharp, Breevaart, Bakker, & van der Linden, 2019). Recent research suggests that PWD can improve job performance and organizational functioning (Bakker *et al.*, 2020). Work-related factors may influence the involvement and effectiveness of PWD (Scharp *et al.*, 2019). Scharp, Bakker and Breevaart (2022) suggested that future research may investigate how PWD is affected by other factors in the workplace setting.

Although studies (e.g. Sonnentag, 2017) argue that individuals can set goals and make work more exciting and meaningful by proactively modifying their work experience, e.g. by creating personal challenges or competing with themselves, the present study argues that work meaningfulness also can predict PWD. Meaningfulness is the most important and valued feature of work for the majority of people (Cascio, 2003). Scholars of organizational psychology have discussed work meaningfulness as a spiritual framework (Ashmos & Duchon, 2000), as an inherent human quest for meaning (Lips-Wiersma & Morris, 2009) and as a multifaceted eudaimonic psychological state (Steger, Dik, & Duffy, 2012). The focus of this study was to analyze employee cognitions about the meaningfulness of their work according to their personal criteria. The value of a work purpose or aim measured against an individual's personal criteria is referred to as work meaningfulness (May, Gilson, & Harter, 2004; Spreitzer, 1995). Wrzesniewski (2003) set forth that to fully engage in proactive behaviors, individuals must perceive work meaningfulness. This study responds to the recent calls to study employee-level outcomes (i.e. PWD) of work meaningfulness (Albrecht, Green, & Marty, 2021; Bragger *et al.*, 2021; Fürstenberg, Alfes, & Shantz, 2021).

Based on the self-determination theory (SDT), in addition to testing the direct effect of work meaningfulness on epistemic curiosity (EC) and PWD, this study also analyzed the mediating role of epistemic curiosity. EC, which is an emotion, refers to the motivational desire that motivates individuals to search, obtain and utilize new knowledge (Litman, 2005; Berlyne, 1954; Loewenstein, 1994). A study by Gino (2018) suggests that 92% of employees believe that curiosity positively affects employee motivation and job performance. Chang and Shih (2019) proposed to test the role of employee epistemic curiosity as a mediator between employee perception of work-related factors and positive employee behaviors. Leader's autonomy support (LAS) refers to a set of leader's behaviors that are thought to encourage and support employees' self-determined motivation (Slemp, Kern, Patrick, & Ryan, 2018). Scharp *et al.* (2022) suggested exploring factors (e.g. leadership role) that can support and promote change by modifying the dynamics of the work environment.

The current study adds to the existing body of knowledge in a number of ways from the SDT perspective. By responding to the recent calls to study work-related factors that influence employee PWD (Scharp *et al.*, 2022) and EC (Chang & Shih, 2019), this study introduced work meaningfulness and epistemic curiosity as triggers to PWD while EC as a mediator has also been studied (Chang & Shih, 2019). Moreover, the leader's autonomous support as a moderator on the relationship between EC and PWD is also examined. LAS as a

moderator provides an explanation about what role autonomous leadership support can play
that can support PWD in the organizations (Scharp *et al.*, 2022). This study answers the call
for research on the factors that can support PWD (Scharp *et al.*, 2022). By investigating
autonomy support by leaders in addition to work meaningfulness and epistemic curiosity,
this study reveals an important boundary condition of PWD that organizations may
stimulate. Thus, this study explains *how, why* and *when* employees engage in PWD activities.
This topic (antecedents and boundary conditions of PWD) has not been adequately
researched yet in the existing literature.

The context of our study (software development firms) is relevant because prior studies
have strongly highlighted the need to investigate the role of play because of the nature of the
work and the important part of the play in the employee-level functioning of software
development firms (Hunter, Jemielniak, & Postuła, 2010).

Based on the above discussion, the research objectives of this study are as follows:

(1) To examine the impact of WM on EC;

(2) To examine the impact of EC on PWD;

(3) To examine the impact of WM on PWD;

(4) To examine the mediating effect of EC on the relationship between WM and PWD;

(5) To examine the moderating effect of LAS on the association of EC with PWD; and

(6) To examine the moderating-mediating impact of LAS on the relationship between
WM and PWD.

2. Theoretical review and hypotheses development
2.1 Self-determination theory
While the other theories (i.e. job characteristics model by Hackman and Oldham (1976)) may
also be suitable ground for investigating employee perceptions of their job and the
consequent psychological states and outcomes, the focus of this study was to understand
how employees' self-determination impacts their proactive actions. SDT is a macro-level
theory of factors that drive human motivation (Deci, Olafsen, & Ryan, 2017). Individuals'
ability to realize their inherent tendencies is contingent on the satisfaction of basic
psychological needs (need for autonomy, relatedness and competence). The essence of SDT is
that people primarily strive for self-determination in their daily lives. SDT is concerned with
the social contexts and self-regulation mechanisms that influence people's feelings of self-
determination, goal-seeking and goal achievement. Building on SDT by Ryan and Deci (2000),
work meaningfulness could influence employee motivation to fulfil their basic psychological
needs, which leads them to involve in playful cognitive–behavioral work design activities
proactively. SDT explains that individuals initiate an activity because they find it interesting
and pleasurable, and therefore, they experience autonomous motivation (Deci & Ryan, 2000).
According to SDT, individuals engage in activities because they find them meaningful (Deci
& Ryan, 2000; Grant, 2008), and leaders' autonomous support facilitates employees' self-
determination (Kong & Ho, 2016). The present study posits that employees' self-
determination is influenced by work meaningfulness that in turn evokes their epistemic
curiosity to engage in playful work design.

2.2 Work meaningfulness and epistemic curiosity
The influence of work-related factors on employee EC can be understood using SDT.
When employees perceive meaningfulness at work, it enhances their intrinsic motivation

(Deci & Ryan, 2000), and this evokes their EC (Kashdan, Rose, & Fincham, 2004). SDT could be a good perspective to look into the causes, processes and consequences of work curiosity (Chang & Shih, 2019). When employees feel WM, they become autonomously motivated and epistemically curious to perform better because it engages them in the activities to fulfil their needs for autonomy, competence and relatedness (Gagné & Deci, 2005). Work aspects that are conducive to fulfillment of employees' basic psychological needs make employees enjoy their work (Andreassen, Hetland, Pallesen, Ashmos, & Duchon, 2010), which is a precursor of curiosity (Chang & Shih, 2019). Accordingly, it is plausible to assume that WM induces employees' EC by impacting their perceptions of autonomy, competence and relatedness. To date, there exists no empirical evidence that links WM to employees' EC. Based on the SDT arguments and insights from the literature, it is hypothesized that:

H1. WM and employees' EC have a positive relationship.

2.3 Epistemic curiosity and playful work design

Scharp *et al.* (2019) defined PWD as a *proactive* cognitive–behavioral orientation that employees use to design fun and competition into their work. It involves proactively behaving to design work experience for enjoyment and challenge without changing the design of the job (Bakker, Scharp, Breevaart, & De Vries, 2020). Berlyne (1954) was the first to posit that curiosity motivates people to behave proactively because of their inner motivational drive. EC supports employees' motivation to proactively design their work that facilitates their needs fulfillment. For example, a software developer may search and obtain interesting information on how effectively and efficiently, and he/she can solve a coding problem while enjoying the task. Building on the SDT premise, employees' EC enhances their proactive involvement in the work when they are intrinsically motivated (Gagné & Deci, 2005). Prior literature supports that employees' work-related curiosity guided by intrinsic motivation facilitates proactive actions (e.g. García-Chas, Neira-Fontela, & Varela-Neira, 2015; Wagstaff, Flores, Ahmed, & Villanueva, 2021). Employees who are involved in PWD proactively increase interactive involvement with work activities, by identifying and dealing with surprises and complex issues (Scharp *et al.*, 2022). As a result, it is expected that employees with a desire to search, learn and apply new knowledge at work (EC) may initiate play during work activities. Building on empirical evidence and theoretical rationale, it is hypothesized that:

H2. EC and PWD have a positive relationship.

2.4 Work meaningfulness and playful work design

WM influences work behaviors (Jiang & Johnson, 2018), and WM can engage employees in proactive activities (Wrzesniewski, 2003). WM motivates the workforce to be agile (Muduli & Pandya, 2018), which is a form of proactive behavior (Dyer & Shafer, 2003). The current study argues that PWD involves a playful proactive cognitive–behavioral approach, which is enabled by WM. For example, a software developer may ask interesting questions from his/her coworkers, online or him/herself to proactively do a coding task or may challenge himself/herself to complete the activity within a certain time limit. Employees' perception of WM induces a drive of self-determination to fulfil their basic psychological needs by redesigning their work. According to the SDT, proactive behaviors are autonomous, and when employees perceive WM, they are likely to behave proactively at work (Parker *et al.*, 2010). Building on empirical evidence and theoretical rationale, it is hypothesized that:

H3. WM and PWD have a positive relationship.

2.5 Epistemic curiosity as a mediator

Employee EC can work as a motivational mechanism between employees' perception of WM and their involvement in PWD. Employees' perception of WM evokes EC through intrinsic motivation (Deci & Ryan, 2000; Kashdan *et al.*, 2004), which involves them in proactive activities (Harrison & Dossinger, 2017). When employees perceive WM, they become epistemically curious to know how they can integrate competition and challenge into their work. For example, WM perceptions of a software developer can make him/her search and obtain information to perform proactive activities that support psychological need fulfillment. PWD is linked to favorable outcomes, including employee engagement, well-being and psychological need fulfillment (Bakker & Leiter, 2017; Scharp *et al.*, 2022; Bakker *et al.*, 2020). To date, no empirical study has investigated the mediating role of EC between WM and PWD. Building on empirical evidence and theoretical rationale, it is hypothesized that:

H4. EC mediates the positive relationship of WM and PWD.

2.6 Leader's autonomous support as a moderator

The leader's position is undoubtedly one of the most important because she or he has formal control over allowing subordinates access to resources and opportunities. Employee attitudes, cognitions and behaviors are influenced by their leaders (Avolio, Walumbwa, & Weber, 2009). According to the SDT, employees perform proactive activities because of autonomous motivation that is linked with positive attitudinal, performance and well-being outcomes (Deci, Olafsen, & Ryan, 2017; Gagné & Deci, 2005). The present study suggests that employees' self-determined cognitions and behaviors are supported by the LAS. LAS includes encouraging leader's behaviors directed toward subordinates to take initiative and exercise discretion for the fulfillment of psychological needs and better outcomes (Deci *et al.*, 2017; Moreau & Mageau, 2012). Leadership support has been found to enhance employee intrinsic motivation and EC to engage in cognitive and behavioral activities that contribute to employee's perception of need fulfillment (Chang & Shih, 2019; Deci *et al.*, 2017; Slåtten, Mutonyi, & Lien, 2020). Leaders can motivate and support employees by signaling that play is permissible at work (Celestine & Yeo, 2021). For example, autonomy supporting leaders in the software development firms can encourage and support curious employees to search, obtain knowledge to take proactive action, redesign work and create a match between personal and work values. Building on empirical evidence and theoretical rationale, it is hypothesized that:
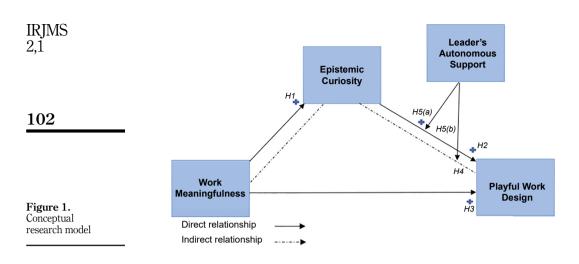
H5a. LAS moderates the direct positive relationship between EC and PWD such that the link is stronger when employees perceive high LAS.

This study hypothesized integrated moderated mediation and suggested that the indirect effect of WM on PWD via EC is moderated by LAS. When employees perceive WM, they become intrinsically motivated, which induces their EC to engage in proactive cognitive and behavioral processes for the fulfillment of their psychological needs. Moreover, LAS can further strengthen the positive direct relationship between EC and PWD, and the indirect relationship between WM and PWD. Supporting through SDT (Deci & Ryan, 2000; Deci *et al.*, 2017), LAS can positively impact employee's self-determination to become epistemically curious and proactively design their work for competition and fun, which contributes to better employee performance and well-being (Scharp *et al.*, 2022).

H5b. LAS moderates the indirect positive relationship between WM and PWD such that the link is stronger when employees perceive high LAS (Figure 1).

Figure 1.
Conceptual
research model

3. Methods

3.1 Research design

The current quantitative study was conducted to analyze the involvement of software development firms' employees in the PWD approaches and activities. The online survey approach was chosen because it has the ability to reach a large number of samples quickly and is cost-efficient (Hughes, 2012). The research hypotheses were empirically tested using data gathered from employees of software development firms operating in the four metropolitan cities of Pakistan (Karachi, Lahore, Islamabad and Rawalpindi). Data were collected using a two-wave design. Since the current pandemic situation has limited access to the workforce in the other countries, the native population was considered for data collection through an online questionnaire. For data collection, the HR departments of the six software development companies were contacted to send the questionnaire link through emails to the employees for data collection. The role of HR departments was only limited to sharing questionnaire links with employees. We adopted various precautionary procedures to reduce the risk of social desirability bias while also protecting the participants' rights. Employees' privacy was kept confidential while ensuring that participation was completely voluntary. A brief note on the purpose of data collection was provided in the questionnaire. Concerns concerning social desirability bias are alleviated by these measures (Spector, 2006).

The first-wave survey sent in November 2021 included measures related to two research variables, (1) WM (2) LAS. The second-wave survey sent in January 2022 included measures related to two research variables, (1) EC (2) PWD. Employees who completed the first-wave survey were sent again for the second-wave data collection using their emails provided in the first-wave completed the survey. In total, 305 responses were received.

3.2 Sample size

For sample size, the rule of thumb, the item-to-response ratio should be minimum of five items for each variable set (Hair, Black, Barry, & Anderson, 2010). Since 31 items were included in the questionnaire, inferential statistics testing can be done with 155–305 samples.

The demographic analysis of respondents shows that approximately 78% were male and approximately 22% were female. With respect to age: approximately 73% were 21–25 years old, 16% were 26–30 years old, 8% were 31–35 years old, 3% were 36–40 years old. Most of the respondents had Bachelor's education level (91.15%), and the remaining percentage of

respondents had a Master's level education. The organizational tenure was 0–3 years for 87.54%, 4–7 years for 11.48% and 8–11 years for 0.98%. Out of 305 respondents, 88.85% were junior software developers, 8.85% were senior software developers, 1.31% were Technical Lead/Quality Assurance Lead and 0.98% were Project Managers (Table 1).

3.3 Measures
Items from previous research were utilized to measure the variables. All scales recorded the respondent's responses on the five-point Likert scale (5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 strongly disagree). To acquire demographic-related information from the respondents, demographic-related questions were also included in the first portion of the questionnaire. *WM:* Spreitzer (1995) developed a three-item scale to assess WM. *"The work I do is meaningful to me"* is a sample item (the alpha coefficient for this scale was 0.83).

EC: EC was measured with EC scale developed by Mussel, Spengler, Litman and Schuler (2011). "I enjoy developing new strategies" is a sample item (the alpha coefficient for this scale was 0.92). *LAS:* LAS was measured through the LAS scale developed by Baard, Deci and

Category	No. of respondents	(%)
Gender		
Male	239	78.36
Female	66	21.64
Age (years)		
21–25	223	73.11
26–30	49	16.07
31–35	23	7.54
36–40	10	3.28
Education level		
Bachelor	278	91.15
Master	27	8.85
Tenure (years)		
0–3	267	87.54
4–7	35	11.48
8–11	3	0.98
Position		
Software Developer	271	88.85
Senior Software Developer	27	8.85
Quality Assurance Lead, Technical Lead	4	1.31
Project Manager	3	0.98
Salary		
<70K (PKR)	43	14.10
71K–85K (PKR)	129	42.30
86K–100K (PKR)	107	35.08
Above 100K (PKR)	26	8.52
Geographical location		
Islamabad	99	32.46
Lahore	75	24.59
Karachi	101	33.11
Rawalpindi	30	9.84

Table 1.
Sample characteristics

Ryan (2004). "My manager listens to how I would like to do things" is a sample item (the alpha coefficient for this scale was 0.81).

PWD: PWD was assessed through PWD scale developed by Scharp *et al.* (2019) "I approach my work in a playful way" is a sample item (the alpha coefficient for this scale was 0.92). A recent study has utilized this scale for analyzing PWD approaches (Bakker, Breevaart, Scharp, & de Vries, 2021).

4. Results
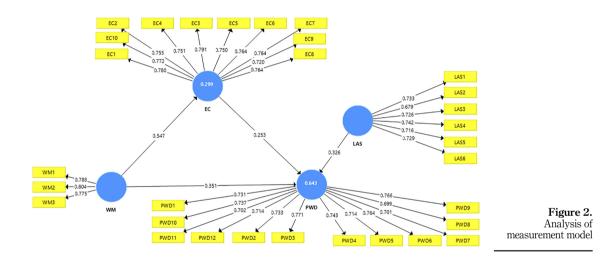### 4.1 Measurement model assessment
Henseler, Ringle, and Sarstedt (2015) argued that PLS-SEM; variance-based SEM) is more reliable as compared to CB-SEM (covariance-based SEM) because it perfectly serves the requirements for explanatory and complex research (Ringle, Sarstedt, Mitchell, & Gudergan, 2020). The measurement and structural model assessment are both part of the PLS-SEM analysis (Hair Jr, Hult, Ringle, & Sarstedt, 2021). For measurement model assessment, measures (criteria to ensure the reliability and validity of measurement model) for reliability (indicator reliability, composite reliability and Cronbach's alpha) and construct validity (average variance extracted (AVE) for convergent validity and Heterotrait-Monotrait (HTMT) ratio for discriminant validity) were examined. The factor loading (indicator reliability) score of each item should be within the 0.50–0.70 range (Chin, 1998). Cronbach's alpha and composite reliability values must be greater than 0.7 to be considered reliable (Hair, Risher, Sarstedt, & Ringle, 2019). The AVE value should be equal to or above 0.50, and HTMT ratio values should be less than 0.90 (Hair Jr *et al.*, 2021). All of the measurement model values met these criteria as shown in Tables 2 and 3. To check if there exists common method bias, Harmans' single-factor test was done, and it was found that CMB was not a problem (maximum variance explained by

Latent variable	Loadings	AVE	CR	CR α
WM	0.788	0.62	0.92	0.83
	0.804			
	0.775			
EC	0.780	0.58	0.93	0.92
	0.772			
	0.755			
	0.791			
	0.751			
	0.750			
	0.764			
	0.764			
	0.764			
	0.720			
PWD	0.731	0.53	0.92	0.92
	0.737			
	0.702			
	0.714			
	0.733			
	0.771			
	0.743			
	0.714			
	0.764			
	0.701			
	0.699			
	0.766			
LAS	0.733	0.52	0.87	0.81
	0.679			
	0.726			
	0.742			
	0.716			
	0.729			

Table 2.
Assessment of validity and reliability

Note(s): CR = Composite reliability

a single factor was 39%, which is below 50% threshold value) (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). The measurement model for analysis is shown in Figure 2.

Variables	EC	LAS	PWD	WM
EC				
LAS	0.859			
PWD	0.744	0.82		
WM	0.677	0.744	0.836	

Note(s): WM, work meaningfulness, EC, epistemic curiosity, LAS, leader's autonomous support, PWD, playful work design

Table 3.
HTMT ratio

Figure 2.
Analysis of measurement model

4.2 Structural model assessment

The structural model was assessed by analyzing values of pathways significance, coefficient of determination (R^2), effect size (f^2) and predictive relevance (Q^2). The results are shown in Tables 4 and 5. A non-parametric bootstrapping test was performed with 5,000 subsamples to get path coefficients β and t-values.

H1 stated that WM and EC have a positive relationship. The results indicated that WM has a significant positive relationship with EC ($\beta = 0.547$, $t = 11.524$, $p < 0.001$, $f^2 = 0.426$); hence, this hypothesis received empirical support.
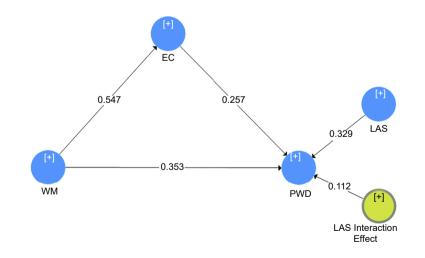
H2 stated that EC and PWD have a positive relationship. EC has a significant positive relationship with PWD ($\beta = 0.253$, $t = 3.118$, $p = 0.002$, $f^2 = 0.075$); hence, this hypothesis received empirical support.
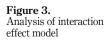
H3 stated that WM and PWD have a positive relationship. WM has a significant positive relationship with PWD ($\beta = 0.351$, $t = 5.220$, $p < 0.001$, $f^2 = 0.224$); hence, this hypothesis received empirical support.

H4 stated that EC mediates the positive relationship between WM and PWD. EC partially mediates the relationship between WM and PWD ($\beta = 0.138$, $t = 2.987$, $p = 0.003$ and VAF = 0.334); hence, this hypothesis received empirical support. The interaction effect model is shown in Figure 3.

Direct paths	Std. beta	Std. error	t-value	p-value	f^2	VIF
WM → EC	0.547	0.047	11.524	0.000**	0.426	1.000
EC → PWD	0.253	0.081	3.118	0.002**	0.075	1.943
WM → PWD	0.351	0.067	5.220	0.000**	0.224	1.769
LAS → PWD	0.326	0.083	3.930	0.000**	0.122	2.107
EC × LAS (interaction)	0.112	0.051	2.213	0.000**	0.032	1.179
Indirect path	Std beta	Std. error	t-value	p-value		
WM → EC → PWD	0.138	0.046	2.987	0.003**		
	Index	BootSE	BootLLCI	BootULCI		
Index of moderated mediation	0.104	0.055	0.010	0.230		
		Bias corrected 95% confidence interval				
Moderator value	Conditional indirect effect	BootSE	BootLLCI	BootULCI		
Low (mean −1 SD)	0.105	0.052	0.240	0.010		
Mean	0.171	0.060	0.307	0.071		
High (mean +1 SD)	0.236	0.077	0.410	0.112		

Note(s): WM, work meaningfulness, EC, epistemic curiosity, LAS, leader's autonomous support, PWD, playful work design. Critical t-values for a two-tailed test are: < 1.96 (**p = 0.05), and for one tail < 1.6 (**p = 0.05)
VIF values should be < 5

Table 4.
Assessment of the structural model

Factor	R^2	Q^2
EC	0.299	
PWD	0.643	0.372

Note(s): EC = Epistemic curiosity, PWD = Playful work design

Table 5.
Assessment of R^2 and Q^2

Figure 3.
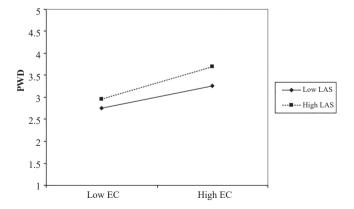Analysis of interaction effect model

H5a stated that LAS moderates direct positive relationship between EC and PWD such that the link is stronger when employees perceive high LAS. LAS positively and significantly moderates the direct relationship between EC and PWD ($\beta = 0.112$, $t = 2.213$, $p < 0.001$, $f^2 = 0.032$); hence, this hypothesis received empirical support.
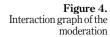
H5b stated that LAS moderates the indirect positive relationship between WM and PWD such that the link is stronger when employees perceive high LAS. To test the conditional indirect effect, latent variable scores were obtained from Smart PLS and then processed in SPSS on the Process Macro program (for Model 14) within the statistical package for social sciences (SPSS). The effect of the independent variable on the dependent variable is conditional on the level of the moderator when the null of zero does not occur between the lower and upper limit of the 95% confidence interval (Hayes & Preacher, 2013). This condition was met [($\beta = 0.104$), CI = 0.010–0.230]; hence, this hypothesis received empirical support (Table 4). Interaction graph is shown in the Figure 4.

These results are presented in Table 4. The R^2 values given in Table 5 show that the model has good explanatory power, R^2 values should be above 0.10 (Falk & Miller, 1992). The size of the effect that one variable has on another is considered small (0.02), medium (0.15) and large (0.35). The effect size values in this study are small, medium and large, as shown in Table 4. The Q^2 value that represents the power of prediction of a model (Geisser, 1974; Stone, 1974) was 0.372, which is greater than 0, showing that the model has good predictive power (Table 5).

5. Discussion

This study found that WM influences employees' EC, and EC positively predicts employee involvement in PWD. H1 that linked WM with EC received empirical support. Employees' perception of their work can arouse their epistemic curiosity, as suggested by Chang and Shih (2019). H2 that linked EC with PWD received empirical support. Similarly, employees' epistemic curiosity can make them think and behave proactively (Berlyne, 1954; García-Chas et al., 2015; Wagstaff et al., 2021). The present study argues that when the perception of work attributes matches the personal criteria for work meaningfulness, employees are likely to enjoy their work and redesign their work playfully to add fun and challenge to their work. According to the SDT, proactive actions are autonomous, and employees who believe their work is meaningful are more inclined to act proactively at work (Parker et al., 2010). H3 that linked WM with PWD received empirical support. H4 that indirectly linked WM with PWD via EC received empirical support. The feeling that work is central to an individual's life meaning can generate epistemic curiosity to engage proactive thinking and actions.

Figure 4.
Interaction graph of the moderation

Furthermore, EC mediated the relationship between WM and PWD. This is consistent with the prior findings of Khan (2021) that EC can act as a mediator between perceived work-related factors and positive employee behaviors from the SDT perspective. The present study argues that leader's autonomous support strengthens the positive relationship between EC and PWD, which aligns with prior arguments (Deci *et al.*, 2017; Slåtten *et al.*, 2020). H5a and H5b stated that LAS can moderate the positive direct relationship between EC and PWD and the indirect relationship between WM and PWD received empirical support.

5.1 Theoretical implications

This study contributes to theory and practice in numerous ways. First, building on the SDT, this study tested WM as an antecedent of EC in the context of software development firms of Pakistan. Prior studies support this finding that SDT can be a suitable ground to analyze what drives EC and its outcomes (Chang & Shih, 2019; Gagné & Deci, 2005; Khan, 2021). When employees perceive work meaningfulness, their sense of relatedness and competence improves. This motivates them to perform at work, and they are likely to become epistemically curious.

Second, employees' EC can predict their involvement in cognitive–behavioral proactive strategies to redesign their work without impacting their job. EC, which is an emotion, can lead employees to design their work playfully that can assist their motivation for basic psychological need fulfillment, which is a central tenet of SDT. Employees' curiosity can fuel their proactive initiatives to integrate elements of play into their work.

Third, EC can act as a mediator between the link of WM and PWD. According to the SDT, perceived work-related factors (i.e. WM) can evoke employees' motivation that can make them curious to learn and apply new knowledge to think and act proactively (Deci *et al.*, 2017). This result is important because it adds to previous research that has focused on how perceived work-related factors (work meaningfulness) induce employee self-determination that drives their PWD initiatives. PWD as a proactive cognitive–behavioral strategy to add fun and challenge in their work for their psychological needs' fulfillment is necessary for employee well-being and improved functioning (Scharp *et al.*, 2022).

Fourth, LAS can act as a moderator between the direct link of EC and PWD, and the indirect link between WM and PWD via EC. Lastly, the present study was conducted in the context of software development firms where understanding the role of play was underscored by the previous research (i.e. Hunter *et al.*, 2010). Employees can use PWD to proactively meet their work requirements, according to the current study. Employees can create fun and design competition throughout work activities to self-determine their experience of autonomy, belonging and competence. Furthermore, the findings contribute to a better understanding of how and why employees participate in PWD. These findings are significant because they serve to explain prior findings and may help to steer future research on PWD theory. Involvement in PWD tends to promote changes in employee motivation and well-being.

5.2 Managerial implications

WM being the most important and valued feature for the majority of people (Cascio, 2003) has several implications for the practice because of its favorable outcomes for the employees and organizations (Deloitte, 2017; Lysova, Allan, Dik, Duffy, & Steger, 2019). Organizations can create work environments and HRM) practices that can improve employees' perception of work meaningfulness which can arouse employees' curiosity to search, obtain and utilize knowledge for their better functioning and well-being. Organizations can consider developing recruitment and selection procedures that ensure there is a match between the personal and career goals of job applicants. This can help organizations to bring in proactive talent and promote desirable proactive behaviors. It is critical for businesses to foster

employee curiosity and encourage beneficial employee behavior (Müceldili, Tatar, & Erdil, 2020). Organizations can promote research-based work environment that facilitates EC and consequent employee behaviors. For example, HRM practices can support EC and better employee performance (Ishaq, Bashir, Khan, Hassan, & Zakariya, 2021). LAS from the leaders of software development firms can support employees' EC to learn and utilize new knowledge, and by extending autonomy to their subordinates to redesign their work for better well-being, work engagement and performance. Thus, the present study encourages leaders of software development firms to provide autonomy support to their subordinates for beneficial employee outcomes. The findings of the present study can be beneficial for other industries as well where there is very little job variation. For example, small packaging companies or clerical assistance providing firms (documentation, filling up forms, etc.) where the work is repetitive and tedious. Key findings and implications are presented in Table 6.

5.3 Strengths, limitations and future insights
Currently, PWD has mainly been studied in Europe, and this study is the first to demonstrate that PWD is prevalent and viable in Asia as well. The data for this study were collected from the software development companies of Pakistan. This study's results are constrained in various respects. It is unclear whether the findings apply to employees of different age groups, genders or professions. Self-reported measures may add common method variance to the results (Podsakoff *et al.*, 2003); however, self-reported measures are suitable and sometimes better to record personal experiences (Conway & Lance, 2010). Sampling could be a challenge while undertaking research in developing countries (Roy, Walters, & Luk, 2001). This study used a non-probability convenience sampling method, which means that the chances of every member being chosen from the population are not equal. In the future, research can address these sampling limitations by using probability-based sampling techniques, which can be used in a variety of contextual settings. Moreover, dyadic data can be analyzed to gain insight from managers' perspectives about PWD involvement by their subordinates. Because the sample for this study was chosen exclusively from Pakistani software development organizations, the generalizability of the findings may be limited. This study used one-dimensional scale, which may not provide in-depth information about employee perceptions of WM. However, several recent studies have used this scale for studying WM (i.e. Morales-Solis, Chen, May, & Schwoerer, 2022). Future studies may use a multidimensional scale of WM developed by Steger *et al.* (2012).

Key findings	Implications
Perceptions of work meaningfulness evoke the epistemic curiosity of employees Employee epistemic curiosity can engage them in PWD activities Perceptions of work meaningfulness positively predict employee involvement in PWD activities Employee epistemic curiosity can work as a mechanism between employees' perception of work meaningfulness and PWD initiatives Leader's autonomous support guides and supports employee's curiosity to engage in PWD activities	Employees improve their personal work experience through playful work design. Theoretically, this study contributes to the body of knowledge on the factors (work meaningfulness, epistemic curiosity and leader's autonomous support) that can influence employees' self-determination to design fun, challenge and competition into their work. For practitioners, this study pinpoints that software development firms can consider improving employees' perception of work meaningfulness that can lead them to become epistemically curious to proactively design their work experience for their psychological need fulfilment, well-being and better functioning. Moreover, leader's autonomous support can support involvement in PWD initiatives

Table 6.
Key findings and
implications

Moreover, research on the antecedents and consequences of PWD is in its infancy stage. Future studies may focus on how individual differences and job characteristics can predict employee involvement in PWD (Bakker *et al.*, 2020). Also, it would also be important to consider the impact of leadership style and team-level interventions targeted at increasing employee involvement in PWD (Bakker, 2022). Moreover, PWD can also be an antecedent of beneficial work outcomes (i.e. engagement, creativity and performance) (Bakker & Leiter, 2017; Scharp *et al.*, 2019, 2022). It is recommended to explore other positive outcomes as a result of employee involvement in PWD. Additionally, the role of WM can also be explored between EC and PWD as a moderator. Future studies may also study PWD using different theoretical lenses (i.e. theory of planned behavior).

5.4 Conclusion
Employees' self-determination emanating from the perception of work meaningfulness can improve their experience of work by integrating fun and competition into their work. The present study highlights how work meaningfulness influences employee epistemic curiosity and involvement in PWD in the context of software development firms. The present study expands the literature on the antecedents of employee PWD strategies while introducing leader's autonomy support as a strengthening effect on the direct relationship between employee epistemic curiosity and playful work design as well as on the indirect relationship between work meaningfulness and playful work design. The findings suggest that when employees perceive work meaningfulness, they become epistemically curious to approach their work proactively. Leadership support in this regard plays a critical role to promote employees' PWD initiatives.

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