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RESEARCH PAPER

Psychological Capital Among University Students: Relationships with Study Engagement and Intrinsic Motivation

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Abstract This paper reports two studies: Study 1 aimed to evaluate respective modified versions of existing scales of psychological capital (PsyCap) and study engagement (SE), and to test the reciprocal relationship between PsyCap and SE; Study 2 aimed to test intrinsic motivation as a mediator between PsyCap and SE. A two-wave cross-lagged design was adopted in Study 1 with a matched sample of 103 students, with 4 months apart. With confirmatory factor analyses, the results supported the construct validity of a higher-order model of PsyCap (PsyCap overall) and of study engagement comprising dedication, absorption and vigor. Further, the reciprocal relationship between PsyCap and SE was demonstrated. Results of Study 2 among 100 university students showed that intrinsic motivation measured at time 2 was a significant mediator between time 1 PsyCap and time 2 SE.

Keywords Cross-lagged analysis · Psychological capital · Study engagement · Intrinsic motivation

1 Introduction

In a global economy, most university students face challenges such as an uncertain economy, globalization of markets, and ever-changing technology. To meet these challenges, it is important to motivate university students to strive for excellence in academic performance through positive psychological capacities and study engagement (SE) so as to

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seek competitive advantage. Since SE is a predictor of study success (Schaufeli et al. 2002a), information about the drivers of engagement is crucial. In a recent study, Ouweneel et al. (2011) found that the experience of positive emotions predicted students' future personal resources which subsequently predicted study engagement. Students who were self-efficacious regarding their study, and who were hopeful and optimistic about their future, showed highest levels of study engagement. These findings are consistent with research on psychological capital (PsyCap) in an organizational context (Luthans et al. 2007). PsyCap is a higher-order construct comprising self-efficacy, hope, optimism, and resilience. In the workplace, PsyCap has been found to be positively related to job satisfaction, job performance and sales (Luthans et al. 2007). Applying work from Luthans and his coworkers (e.g., Luthans 2002; Luthans and Youssef 2007) to an educational context, we believe that in order to be able to face the rapidly changing modern society and study-life interface, university students who are future employees also need to cultivate PsyCap. Yet, to date, there have not been any studies on PsyCap using university student samples, and it is even rarer in Hong Kong. It is important to investigate whether PsyCap is a valuable personal resource among Hong Kong university students who are future employees, because PsyCap could enhance their engagement in studying and increase students' academic performance.

The objectives of the study are: to evaluate respective modified versions of existing scales of PsyCap and SE, and to test the reciprocal relationship between PsyCap and SE (Study 1); and to examine the mechanism linking PsyCap and SE with intrinsic motivation as a mediator (Study 2).

2 Theoretical Background

In line with the development of positive psychology (Seligman and Csikszentmihalyi 2000), there has been emerging work on SE in Western societies (Ouweneel et al. 2011; Salanova et al. 2003; Salanova et al. 2010; Schaufeli et al. 2002a). SE is a concept modeled after work engagement (Schaufeli et al. 2002b). Work engagement is defined as '…a positive, fulfilling, and work-related state of mind that is characterized by vigor, dedication and absorption' (Schaufeli and Bakker 2004, p. 295). Salanova et al. (2010) argued that students' core activities can be considered as 'work' such as attending lectures, working on assignments, and studying. Further, like employees, students work toward specific goals including completion of courses, academic performance, getting a degree, etc. Hence, SE in this paper is conceptualized as a positive, fulfilling state comprising vigor, dedication, and absorption in learning. There is a concern that if students are not fully engaged in their study, their academic performance will be affected. Schaufeli et al. (2002a) found that the vigor component of SE was positively related to academic performance. In addition, several other studies have demonstrated that SE and academic performance are positively related (e.g., Salanova et al. 2003; Salanova et al. 2010).

PsyCap is defined as being "an individual's positive psychological state of development characterized by: (1) having confidence (self-efficacy) to take on and put in the necessary effort to succeed at challenging tasks; (2) making a positive attribution (optimism) about succeeding now and in the future; (3) persevering towards goals, and when necessary, redirecting paths to goals (hope) in order to succeed; and (4) when beset by problems and adversity, sustaining and bouncing back and even beyond (resiliency) to attain success" (Luthans et al. 2007, p.3). According to conservation of resources (COR) theory (Hobfoll 1989), it is unlikely that resources exist in isolation of each other because people try to

accumulate their resources. COR theory predicts that this accumulation of resources will result in positive personal outcomes like engagement (Hobfoll 2002). PsyCap can be viewed as an important personal resource. Personal resources help to attain goals, because individuals with many resources can better cope with the hindrance demands they face. Thus PsyCap will help university students meeting the challenges of their study. PsyCap represents the positive agentic resources individuals possess, which enable them to move towards flourishing and success (Sweetman and Luthans 2010).

According to Bandura (1997), the most important determinants of the behaviors people choose to engage in and how much they persevere in their efforts in the face of obstacles and challenges are "people's beliefs in their capabilities to produce desired effects by their own actions" (p. 7). Thus, individuals with high self-efficacy are more willing to spend additional energy and effort on completing a task or an assignment and hence to be more involved when studying with high level of absorption.

Optimism is the belief that good things will happen (Scheier and Carver 1985). Thus optimistic individuals having these self-beliefs expect success when they are presented with a challenge (Carver and Scheiver 2002). They are quicker to accept challenges, and they engage in more focused and active coping (Carver and Scheiver 1998). Thus, it is possible that optimists will be more engaged in their studies through more involvement and more absorption.

Hope was originally conceptualized as 'a cognitive set that is based on a reciprocal-derived sense of successful agency (goal-directed determination) and pathways (planning to meet goals)' (Snyder et al. 1991, p. 571). Snyder et al. (2002) summarized that hopeful thought reflects the belief that one could find pathways to desired goals and become motivated to use those pathways. Hence, hope enables individuals to direct energy or vigor wholeheartedly to pursue a goal, and therefore an antecedent of study engagement.

Masten and Reed (2002) referred to resilience as a class of phenomena characterized by patterns of positive adaptation in the context of significant adversity or risk, and they argued that resilient individual could thrive through positive adaptation to adversities encountered. When facing adversities, resilient individuals draw from their psychological resources to exhibit the vigor of persistence and thus exert behaviors through the motivation path of engaging in the work at hand.

3 Hypotheses

3.1 Relationship Between Psychological Capital and Study Engagement

The argument that PsyCap is a predictive factor of SE could be supported by the JD-R model in which personal resources are believed to change study demands into challenges (Bakker and Demerouti 2008). They help one to recover from "yesterday's" difficulties, and to be re-motivated, hence to concentrate on, to be dedicated, and get absorbed in one's work (Bakker et al. 2008). We believe PsyCap is a new global personal resource in the model of work engagement (Bakker 2011) which is positively related to SE particularly when university students are facing great challenge demands.

3.2 Reversed Relationships

Conservation of resources theory also suggests a possible reverse relationship between PsyCap and SE. In this theory, individuals strive to protect and create resources over time (Bakker and Demerouti 2008; Hobfoll 2001, 2002). Therefore, engaged students are more

likely to perform well, then the good outcomes may be viewed as positive feedbacks of their competence and efforts, hence boosting their PsyCap (resources) through enhancing their confidence (self-efficacy), making them to expect a brighter future (hope and optimism), or enabling them to endure frustration (resilience). Recent studies provide empirical evidence for a reciprocal relationship between personal resources and engagement (e.g., Xanthopoulou et al. 2009). For instance, Salanova et al. (2011) found from 100 university students in Spain that efficacy beliefs reciprocally influence activity engagement indirectly through their impact on positive affect over time. These evidences make us tentatively postulate that PsyCap and SE could be mutually influencing each other. We intended to investigate whether university students in Hong Kong with high levels of PsyCap are more engaged in their studies, or engaged student are more likely to accumulate PsyCap using the COR theory (Hobfoll 2002) and the model of work engagement (Bakker 2011; Bakker and Demerouti 2008; Bakker and Leiter 2010).

The bidirectional relationship between some factors of PsyCap (self-efficacy and optimism) and work engagement has been integrated in the JD-R model of work engagement (Bakker and Demerouti 2008; Bakker and Leiter 2010). This model generalizes that personal resources can impact engagement and then performance, meanwhile performance and work engagement generally have feedback loops to the resources. This can be explained by the notion of resource caravans as assumed by COR theory. Employees working in a resourceful work environment are likely to reinforce their beliefs in their capabilities and resilience, have more efficacy beliefs, and be more optimistic about meeting their goals. In other words, positive psychological constructs of PsyCap and work engagement are mutually reinforcing each other.

Although previous empirical evidence strongly supports the association between PsyCap and work engagement, no direct test has been focused on the reciprocal linkages between these two core constructs, and research on the relationship between PsyCap and SE among students is even rarer. One of the very few similar ones was conducted by Ouweneel et al. (2011). They demonstrated that positive emotions, personal resources, and SE are reciprocally related among university students in Netherlands.

3.3 Intrinsic Motivation as a Mediator Between PsyCap and SE

Motivation implies the direction and intensity of an individual's energies or vigor (Maehr and Meyer 1997). Students with the psychological capacity of PsyCap should know their goals thus are intrinsically motivated to study/work, and eventually exert more effort. Intrinsic motivation refers to motivation that is driven by an interest or enjoyment in the task itself, and exists within the individual rather than relying on any external pressure or outcome (Amabile et al. 1994; Deci and Ryan 1985). We believe students with high PsyCap, a high motivational propensity, are more intrinsically motivated and intrinsic motivation is favorable to engagement (Deci and Ryan 1985). Hence, we expect intrinsic motivation will be a mediator between PsyCap and SE.

As argued earlier, students with the psychological capacity of PsyCap should focus on their goals thus is intrinsically motivated to study/work, and eventually exert more effort. With confidence and positive attribution, higher PsyCap maintains higher level anticipation of academic performance. This kind of evaluation do affect intrinsic motivation, this can be explained by Vroom's (1964) expectancy theory of motivation. Further, in the motivational path of the JD-R model, the availability of resources may help employees to cope with the demanding aspects of their work and simultaneously stimulate them to learn and grow in their work, which may lead to motivation (Bakker and Geurts 2004). Recently, Bakker (2011)

stated in an overall model of engagement that environmental resources or personal resources take an intrinsic motivation role because they become more salient and gain their motivational potential when people are confronted with high job demands, which in turn lead to individuals' growth, learning, and development. Bakker (2011) also argued that work engagement is different from motivation. Yet intrinsic motivation has never been measured in past studies adopting the JD-R model or the model of work engagement. In a university context, we believe individuals with high personal resource of PsyCap should be intrinsically motivated when they study due to attraction of the study subject itself, therefore feel more absorbed, dedicated and full of vigor, and therefore more engaged in study. Based on previous research findings in Western societies, the following hypotheses are formulated:

Hypothesis 1 PsyCap at Time 1 will be a predictor of SE at time 2.

Hypothesis 2 SE at time 1 will be a predictor of PsyCap at time 2.

Hypothesis 3 Intrinsic motivation will be a mediator between PsyCap and SE, in that intrinsic motivation at time 2 will mediate the relationship between PsyCap at time 1 and SE at time 2.

4 Study 1: Method

A two-wave cross-lagged design was adopted, PsyCap as well as SE were assessed twice, with 4 months time lag. Because both PsyCap and SE are state-like, moderate stable constructs, we considered 4 months interval is appropriate as the cross-lagged effects between the two constructs are likely to take place meanwhile are not so likely to be altered within this period.

4.1 Participants and Procedure

Students were invited from a university in Hong Kong to participate. At time 1, 220 questionnaires were distributed and collected before lectures. The researcher introduced the project purpose and sought their consents to participate. The anonymity and confidentiality were assured, and they were asked to write a self-identifiable code on the questionnaire cover for matching purpose. 184 completed ones were received making an 83.64 % response rate.

At time 2, 200 questionnaires were distributed and 146 completed ones were returned making a response rate of 73.00 %. After matching, we received 103 (33 males, 70 females) matched cases. The lost cases were due to unmatched codes, or a large proportion of incomplete items. To assess the potential participating biases, we conducted two t-tests to compare the differences in PsyCap and SE between the matched and unmatched groups using time 1 data. The results showed that there was no significant difference between either PsyCap ($t = 1.10$, $df = 182$, $p = .27$, effect size $= .16$) or SE ($t = -.19$, $df = 182$, $p = .85$, effect size $= .03$)

4.2 Measures

4.2.1 Psychological Capital

Luthans et al. (2007) developed a 24-item measure of PsyCap (PCQ) with each subscale having 6 items. We did not use the original PCQ in the present study because the reliability

of its optimism and resilience scales are not that high (from .66 to .72). We therefore chose Siu's et al. (2009) 9-item resilience measure which showed higher reliability in Chinese samples. We only selected 4 items which are similar to the items used by Luthans et al. (2007). A sample item is: "In really difficult situations, I feel able to respond in positive ways". We adapted a Western optimism scale (Scheier et al. 1994) for our measure but we only chose the 4 positive items. We excluded the negative wording items because negative wording items often produce artificial factors (Podsakoff et al. 2003) and Chinese are more confused by negative items (Siu 2002). A sample item is: "I am always optimistic about my future". Further, in line with Luthans' et al. (2007) proposal of having same number of items for each factor of PsyCap so as to achieve equal weight, we also selected four items of Snyder's et al. hope scale. A sample item is: "There are lots of ways around any problem". Finally, we extracted four items from the Generalized Self-efficacy Scale (Schwarzer et al. 1997) to measure self-efficacy, which has previously been studied with work engagement (Xanthopoulou et al. 2009), and that were validated in Chinese university students (Schwarzer et al. 1997). A sample item is: "I am confident that I could deal efficiently with unexpected events". All of the items were translated into Chinese by a back translation method (Brislin 1980). We adopted a six-point Likert-type response scale ranging from 1 (strongly disagree) to 6 (strongly agree). The Cronbach's alphas for resilience, optimism, hope, self-efficacy, and the PsyCap overall were .81, .88, .81, .83 and .91 in time 1, and .82, .93, .88, .90 and .95 in time 2 respectively.

4.2.2 Study Engagement

A recent study using undergraduates in China demonstrated the validity of the Utrecht SE Scale, with items referring to work or job replaced by studies or class (Zhang et al. 2007). The short Chinese version (9 items) of Utrecht Work Engagement Scale was also adapted (Lu et al. 2011; Schaufeli et al. 2006) because it has sound face validity and psychometric properties. Each of the three subscales of vigor, dedication, and absorption consisted of 3 items. The referent was only changed from 'work' to 'study' in our measure. Sample items are: "When I study, I feel like I am bursting with energy"; "When I get up in the morning, I feel like going to class"; and "I can get carried away by my studies". A 7-point rating scale ranging from 0 (never) to 6 (always) was employed. The Cronbach's alphas for vigor, dedication and absorption were .80, .84 and .69 in time 1, and .82, .90 and .74 in time 2 respectively.

4.3 Data Analysis

We tested the construct validity of PsyCap empirically with confirmatory factor analysis (CFA). We first tested a one-order, four correlated factors model in which four latent variables represented each of the four sub-constructs of PsyCap. Next, we compared this model with a series of nested models in which each two of the four sub-constructs were merged (consequently 6 models),and then a one-factor global model. Finally, we compared the one-order model with a higher-order model in which a core factor (i.e. PsyCap overall) representing the four sub-constructs. All of these analyses were separately conducted using the time 1 and time 2 data. Similar CFA was also conducted on SE.

We used parceling strategy in the models testing the relationship between PsyCap and SE. Parceling is commonly used when small sample is recruited (e.g., $N = 103$ in our study) in order to reduce the sample size/item ratio so that the estimates of parameters would be more accurate (Hau and Marsh 2004; Little et al. 2002). Specifically, we created four manifested variables representing resilience, hope, optimism, and self-efficacy using

the mean of their respective four item scores as the indicators of the latent variable—PsyCap (both in time 1 and time 2). Similarly, SE was indicated by three manifested variables by calculating the mean score of the respective three items of vigor, dedication, and absorption.

5 Study 1: Results

5.1 Descriptive Statistics

The means, SDs, and alphas of dimensions of PsyCap, SE, as well as the overall PsyCap and SE at time 1 and time 2 are presented in Table 1. Table 2 presents the correlations among these variables for time 1 and time 2.

5.2 Confirmatory Factor Analysis

The model fit information and the Chi square test results of model comparison of CFA of PsyCap are presented in Table 3. We can first see that the one-order, four factors model fits both time 1 and time 2 data quite perfectly. Further, all the three-factor models were less fit than the four factors model as the Chi square change became significant. These results indicate that any of the four factors is distinct from each of the other three. When all the four factors were merged into a single factor, the model fit became even worse. Finally, the higher-order model of PsyCap was supported. In both time 1 and time 2, the higher-order model fits the data well (time 1: $\chi^2 = 176.19$, $df = 100$, $p < .001$, TLI = .90 CFI = .92, SRMR = .060; time 2: $\chi^2 = 166.61$, $df = 100$, $p < .001$, TLI = .94 CFI = .95, SRMR = .050). Model comparisons showed equal excellence of fitness between the higher-order model and the first-order model. In both times, the model fit indices (TLI, CFI, SRMR) kept nearly unchanged. According to Cheung and Rensvold's (2002), the cutoff level for model fit comparisons that showing a change in CFI $\leq$ .010 would indicate a non-significant difference, our results thus show that the higher-order model of PsyCap fits as good as the one-order model (time 1: ΔCFI = .000; time 2: ΔCFI = .000). In terms of the Chi square change, in time 1, it was insignificant, and in time 2, it was small ($\Delta\chi_2{}^2 =$ 6.98 although it exhibited a significance at .05 level.

Table 1 Means, SD and alphas of main variables in Study 1

Variables (number of items)	Time 1			Time 2		
	Mean	SD	Alphas	Mean	SD	Alphas
PsyCap (16)	63.35	11.48	.91	64.33	13.38	.95
Resiliency (4)	14.36	3.33	.81	14.84	3.40	.82
Optimism (4)	16.57	4.05	.88	16.64	4.43	.93
Hope (4)	16.96	2.83	.81	16.75	3.56	.88
Self-efficacy (4)	15.46	3.11	.83	16.11	3.67	.90
Study engagement (9)	27.90	8.42	.90	28.82	9.44	.93
Vigor (3)	8.65	3.03	.80	9.00	3.45	.82
Dedication (3)	10.32	3.02	.84	10.45	3.45	.90
Absorption (3)	8.93	3.28	.69	9.37	3.33	.74

PsyCap psychological capital

Table 2 Correlations between PsyCap and SE in Study 1

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
PsyCap T1	1																	
Resiliency T1	.86**	1																
Optimism T1	.88**	.65**	1															
Hope T1	.86**	.66**	.68**	1														
Self-efficacy T1	.85**	.66**	.63**	.65**	1													
PsyCap T2	.68**	.61**	.59**	.62**	.53**	1												
Resiliency T2	.62**	.62**	.46**	.57**	.49**	.87**	1											
Optimism T2	.60**	.49**	.65**	.51**	.39**	.90**	.73**	1										
Hope T2	.61**	.52**	.51**	.61**	.48**	.89**	.68**	.71**	1									
Self-efficacy T2	.60**	.54**	.47**	.52**	.57**	.89**	.71**	.69**	.78**	1								
SE T1	.41**	.35**	.34**	.44**	.31**	.42**	.37**	.35**	.41**	.36**	1							
Vigor T1	.38**	.34**	.31**	.41**	.25**	.42**	.38**	.40**	.37**	.33**	.93**	1						
Dedication T1	.33**	.28**	.27**	.36**	.24*	.27**	.27**	.20*	.30**	.21*	.90**	.76**	1					
Absorption T1	.41**	.34**	.33**	.41**	.35**	.45**	.35**	.37**	.45**	.43**	.88**	.75**	.64**	1				
SE T2	.42**	.40**	.33**	.43**	.30**	.51**	.45**	.46**	.50**	.40**	.53**	.51**	.47**	.44**	1			
Vigor T2	.42**	.38**	.331**	.44**	.30**	.51**	.46**	.48**	.47**	.41**	.47**	.51**	.40**	.35**	.93**	1		
Dedication T2	.35**	.33**	.29**	.36**	.24*	.41**	.35**	.37**	.41**	.31**	.52**	.48**	.51**	.41**	.92**	.78**	1	
Absorption T2	.38**	.39**	.28**	.38**	.29**	.48**	.42**	.40**	.49**	.39**	.47**	.41**	.40**	.45**	.91**	.78**	.75**	1

PsyCap psychological capital, *SE* study engagement, *T1* time 1, *T2* time 2

** $p < .01$, *** $p < .001$

Table 3 CFA of PsyCap in Study 1

Model of PsyCap		χ^2	*df*	*P*	TLI	CFI	SRMR	$\Delta\chi^2(df)$
One order, four-factor model	Time 1	175.91	98	.00	.90	.92	.06	–
	Time 2	159.63	98	.00	.94	.95	.05	–
Merge self-efficacy and resiliency	Time 1	203.16	101	.00	.87	.89	.07	27.26*** (3)
	Time 2	207.43	101	.00	.90	.92	.06	47.80*** (3)
Merge self-efficacy and optimism	Time 1	228.61	101	.00	.84	.86	.07	52.71*** (3)
	Time 2	269.65	101	.00	.85	.87	.07	11.02*** (3)
Merge self-efficacy and hope	Time 1	207.17	101	.00	.86	.89	.07	31.27*** (3)
	Time 2	188.19	101	.00	.92	.93	.05	28.56*** (3)
Merge resiliency and optimism	Time 1	216.15	101	.00	.85	.88	.07	40.25*** (3)
	Time 2	198.22	101	.00	.91	.93	.06	38.59*** (3)
Merge resiliency and hope	Time 1	191.65	101	.00	.88	.90	.07	15.75*** (3)
	Time 2	198.18	101	.00	.91	.93	.07	38.55*** (3)
Merge optimism and hope	Time 1	21.99	101	.00	.86	.88	.07	35.09 (3)
	Time 2	245.77	101	.00	.87	.89	.07	86.14*** (3)
One-factor model	Time 1	268.91	104	.00	.80	.82	.08	93.01*** (6)
	Time 2	323.63	104	.00	.80	.83	.07	164.00*** (6)
Second order model	Time 1	176.19	100	.00	.90	.92	.06	.28 ($p = .87$) (2)
	Time 2	166.61	100	.00	.94	.95	.05	6.98* (2)

χ^2 chi square, *df* degree of freedom, *CFI* comparative fit index, *TLI* tucker lewis index, *SRMR* standardized root mean square residual

*** $p < .001$, * $p < .05$

For SE, the higher order model fits data quite well (time 1: $\chi^2 = 45.68$, $df = 24$, $p < .001$, TLI = .93 CFI = .96, SRMR = .051; time 2: $\chi^2 = 58.07$, $df = 24$, $p < .001$, TLI = .92 CFI = .95, SRMR = .051). The fitness decreased significantly when the three factors were replaced by a single factor (time 1: $\Delta\chi_2^2 = 10.19$, $p < .01$; time 2: $\Delta\chi_2^2 = 23.36$, $p < .001$).

5.3 Testing the Relationship Between PsyCap and SE

We first set directive path from both time 1 PsyCap and time 1 SE to both time 2 PsyCap and time 2 SE so as to specify a reciprocal model (see Fig. 1). The reciprocal model fits data very well ($\chi^2 = 75.36$, $df = 65$, p = .18, TLI = .99 CFI = .99, SRMR = .045), and both paths from time 1 PsyCap to time 2 SE and from time 1 SE to time 2 PsyCap were significant (see Fig. 1). These findings suggest a reciprocal relationship between PsyCap and SE. We then compared the reciprocal model with two 'unilateral' models which set path from time 1 SE to time 2 PsyCap to be zero (M2), or set path from time 1 PsyCap to time 2 SE to be zero (M3), while kept other parts the same as the reciprocal model. The results show that both M2 and M3 fit significantly worse than the reciprocal model (M2 : $\Delta\chi_1^2 = 3.98$, $p < .05$; M3 : $\Delta\chi_1^2 = 7.86$, $p < .01$). In the reciprocal model, though both were significant, the path coefficient from time 1 PsyCap to time 2 SE was higher than from time 1 SE to time 2 PsyCap (see Fig. 1). At the final stage, we compared the reciprocal model to a model which set the two paths (from time 1 PsyCap to time 2 SE, and from time 1 SE to time 2 PsyCap) as equal. We found that this constrain did not change the

fit of the model to the data ($\Delta\chi_1^2 = 1.65$, $p = .20$), implying that the effect of PsyCap on SE is equivalent to the effect of SE on PsyCap. Thus, both H1 and H2 are fully supported.

6 Study 1: Discussion

One of the purposes of Study 1 was to evaluate respective modified versions of existing scales of PsyCap and SE. The results demonstrated the reliability and validity of the two scales. Another purpose of Study 1 was to test the reciprocal relationship between PsyCap overall and core factor SE. The results obtained from a series of cross-lagged panel analyses confirm this hypothesized reciprocal relationship in a sample of university students in Hong Kong. With validated measures of PsyCap and SE, and by adopting a 2-wave design, our study has demonstrated the empirical evidence of a reciprocal relationship between these two constructs. Both the influence from time 1 PsyCap to time 2 SE and the influence from time 1 SE to time 2 PsyCap were significant, and the effects were statistically equal to each other. These results corroborate previous findings by Xanthopoulou et al. (2009) and Ouweneel et al. (2011).

7 Study 2: Method

7.1 Participants and Procedures

Students were recruited from the same university in Hong Kong as in Study 1. Similar procedures were conducted as in Study 1 We distributed 200 questionnaires and received 182 completed ones making a 91.00 % response rate. At time 2, 182 questionnaires measuring intrinsic motivation and SE were distributed and 129 completed (23 males, 102 females, 4 unidentified) ones were returned making a response rate of 70.88 %. However, only 100 completed ones could be matched.

7.2 Measures

We adopted same measures for PsyCap and SE as used in study 1. The alpha for PsyCap was 0.93 for time 1 and that for SE was 0.93. With this sample, again, the high-order model of PsyCap was also supported with good fit indexes ($\chi^2 = 154.87$, $df = 100$, $p < .001$, TLI = .89 CFI = .96, SRMR = .041) which differed non-significantly from the one-order, four factors model ($\Delta\chi_2^2 = 1.92$, $p = .38$).

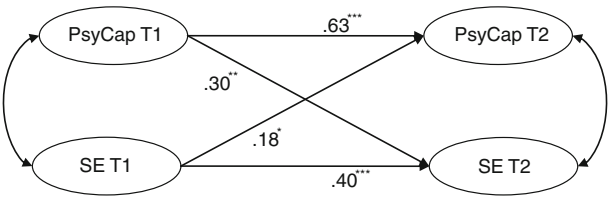

Fig. 1 A cross-lagged model of PsyCap and SE in Study 1. *PsyCap* psychological capital, *SE* study engagement, *T1* time 1, *T2* = time 2. Standardized coefficients are presented *$p < .05$, **$p < .01$, ***$p < .001$

7.2.1 Intrinsic Motivation

The 15 items that assess the degree to which respondents enjoy the challenge of the work at hand in the Work Preference Inventory (Amabile et al. 1994) was used. Sample items are: "I enjoy tackling problem that are completely new to me"; and "It is important for me to be able to do what I most enjoy". A four-point scale ranging from 1 (never or almost never true of you) to 4 (always or almost always true of you) was adopted. The items were translated into Chinese using a back translation method (Brislin 1980). The alpha was 0.84.

8 Study 2: Results

The means, SD and correlations among main variables are depicted in Table 4. Time 1 PsyCap was positively correlated with Time 2 intrinsic motivation but moderately correlated with Time 2 SE. Further, intrinsic motivation was positively correlated with SE.

8.1 Testing Mediating Effect of Intrinsic Motivation

We used SEM with bootstrapping to test whether the significant pathways running between PsyCap at T1 and SE at T2 through intrinsic motivation at T2. Before that, we again constructed items parcels for each latent variable in the models given our relatively small sample. Similarly as in Study 1, we created four manifested variables representing resilience, hope, optimism, and self-efficacy as the indicators of the latent variable—PsyCap at T2. SE was indicated by three manifested variables by calculating the mean score of vigor, dedication, and absorption. Last we randomly created three parcels of items for intrinsic motivation at T2.

Bootstrapping is a statistical re-sampling method that estimates the parameters of a model and their standard errors strictly from the sample (Preacher and Hayes 2004). We extracted new samples (with replacement) from our sample 2,000 times and calculated all direct and indirect estimates of the hypothesized model. Bootstrapping computes more accurate confidence intervals (CI) of indirect effects ($x \rightarrow m \rightarrow y$) than the more commonly used methods, such as the causal steps strategy (Baron and Kenny 1986), as it does not impose the assumption that the sampling distribution is normal (Preacher and Hayes 2004). This is especially relevant for indirect effects, as these have distributions that are skewed away from zero (Shrout and Bolger 2002). The null hypothesis, which states that x does not have an indirect effect on y via m, is rejected when the entire CI with 95 % confidence level lies above or below zero.

Table 4 Means, SD, and correlations of the main variables in Study 2

Variables	M	SD	1	2	3
1. Time 1 PsyCap	62.19	9.85	(.93)		
2. Time 2 intrinsic motivation	41.18	5.64	.27**	(.93)	
3. Time 2 study engagement	24.48	9.13	.41*	.40**	(.84)

Cronbach's alphas are in parentheses on the diagonal

PsyCap psychological capital

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

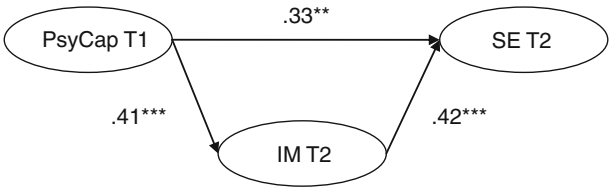

Fig. 2 The proposed mediation model in Study 2. *PsyCap* psychological capital, *IM* intrinsic motivation, *SE* study engagement, *T1* time 1, *T2* time 2. Standardized coefficients are presented $^{**}p < .01$, $^{***}p < .001$

Figure 2 depicts the structural model linking PsyCap T1 to SE T2 through the intrinsic motivation T2. All hypothesized pathways were significant and the model showed a good fit to the data ($\chi^2 = 69.25$, $df = 32$, TLI = .91, CFI = .93, SRMR = .071). In line with our expectations, PsyCap at T1 was positively related to intrinsic motivation at T2 ($\beta = .41$, $p < .001$). Further, while controlling for the direct effect of PsyCap at T1 on SE at T2 ($\beta = .33$, $p < .01$), we found that intrinsic motivation at T2 was positively related to SE at T2 ($\beta = .42$, $p < .001$). The bootstrap analyses confirmed that the pathways running from T1 PsyCap to T2 SE through intrinsic motivation at T2 (bootstrap estimate = .35, SE= .19, lower CI = .12, higher CI = .86, $p < .01$). Those results support Hypothesis 3.

We also tested if intrinsic motivation mediated the relationship between the separate components of resilience, optimism, hope, self-efficacy on the one hand, and SE on the other hand. The bootstrapping results showed that the mediating role of intrinsic motivation was supported for resilience (bootstrap estimate = .14, SE = .08, lower CI = .02, higher CI = .33, $p < .05$), hope (bootstrap estimate = .17, SE = .08, lower CI = .06, higher CI = .38, $p < .01$) and self-efficacy (bootstrap estimate = .16, SE = .09, lower CI = .04, higher CI = .40, $p < .01$), but not for optimism (bootstrap estimate = .13, SE = .09, lower CI = −.02, higher CI = .37, $p = .075$).

9 Study 2: Discussion

The purpose of Study 2 was to reveal the underlying mechanism between PsyCap and SE by testing the mediating role of intrinsic motivation. The results revealed the partial mediation effect of intrinsic motivation on the relationship between PsyCap and SE. This can be explained by the nature of PsyCap which is a high motivational propensity (Luthans et al. 2007). Individuals who were intrinsically motivated should study due to sheer fascination for the study subject, rather than simply because of its outcomes (Deci and Ryan 1985), hence they were more engaged in study. Our results can provide explanation of why the student engagement instrument validated by Appleton et al. (2006) was unrelated to extrinsic motivation. Nevertheless, as the mediation by intrinsic motivation is not as strong and clear as it should be, there might be a possibility that a part of the total effect of PsyCap on SE might be grade-oriented, and hence mediated by extrinsic motivation.

10 General Discussion

It seems that the reciprocal relationship between PsyCap and SE is universal. We regard COR theory (Hobfoll 2002) is appropriate to provide useful interpretations for the reversed influence of SE on PsyCap as found in Study 1. COR theory emphasizes a cognition

focused interpretation. The feedback effect of SE on broadening personal resources could further enhance this construct's added value to theories in personality and in the field of educational psychology. This is also in line with the Demands-Resources model of engagement (Bakker 2011; Bakker and Demerouti 2008). We found student engagement and intrinsic motivation were separate construct and intrinsic motivation was a predictor of SE from Study 2. In sum, the relationship between PsyCap and SE is reciprocal among university students, and intrinsic motivation is a mediator between PsyCap and SE.

10.1 Theoretical Contributions

Our empirical findings corroborate the specific part of Bakker and Demerouti's (2008) integrative JD-R model of work engagement therefore contributing to the expansion of work engagement theory to student samples. As argued earlier, the underlying mechanism between PsyCap and work engagement has not been explored much, and that between PsyCap and SE is even rarer. The present study has therefore made contribution to the field by drawing an attention on the role of intrinsic motivation in the study processes. Furthermore, in both studies 1 and 2, we compared the second order model and the one order model by vigorous tests, providing good validation evidence showing that PsyCap is a higher-order core construct and a greater resource than the four psychological resources.

In sum, our studies have several theoretical contributions: first, by testing the relationship between PsyCap and SE, our findings have expanded research literature in PsyCap, developing theories in positive psychology. Second, conducting an exploratory study to examine the mediating role of intrinsic motivation between PsyCap and SE will provide evidence enriching and expanding the JD-R model. Third, our study has contributed to the literature by empirically testing whether intrinsic motivation is a mediator of the relationship between PsyCap and SE. This mediating relationship has not been explored much in previous PsyCap studies.

10.2 Practical Implications

Like previous studies (e.g., Appleton et al. 2006), the developed and validated respective measure of PsyCap and SE can be used by university administrators and teaching staff in all universities in Hong Kong to assess them as learning outcomes so as to improve students' learning processes. Furthermore, employers can use these measures for assessment, selection and training in Hong Kong and in other Chinese settings. In the current study, we used an occupation-free sample—university students who will join the workforce after graduation in a year or two, hence it has a wider generalizability to future employees who will work in more variety of occupations.

11 Limitations and Future Direction

Although the two-wave cross-lagged design of Study 1 alleviates the weakness of common method variance (Podsakoff et al. 2003), it also has limitations. Firstly, the self-report nature of our data cannot entirely avoid the risk of common method bias which may inflate the correlations between the variables. Second, a cross-lagged design cannot offer definite evidence for causality; especially when the relationship between the two examined constructs is reciprocal, a third variable may cause both constructs' covariance. Fourth, in Study 2 we did not measure all the variables at each time point, which do not allow us to

test the mediating effect using more rigorous method. Finally, having small sample sizes for both studies is also a possible limitation. These findings pave the path for future studies to further elaborate the process of how PsyCap and SE influence each other among employees in the workplace in Western and Chinese societies.

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References

Amabile, T. M., Hill, K. G., Hennessey, B. A., & Tighe, E. M. (1994). The work preference inventory: Assessing intrinsic and extrinsic motivational orientations. *Journal of Personality and Social Psychology, 66*, 950–967.

Appleton, J. L., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology, 44*, 427–445.

Bakker, A. B. (2011). An evidence-based model of work engagement. *Current Directions in Psychiological Science, 20*, 265–269.

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International, 13*, 209–223.

Bakker, A. B., & Geurts, S. A. E. (2004). Towards a dual-process model of work-home interference. *Work and Occupations, 31*, 345–366.

Bakker, A. B., & Leiter, M. P. (2010). Where to go from here: Integration and future research on work engagement. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 181–196). New York: Psychology Press.

Bakker, A. B., Schaufeli, W. B., Leiter, M. P., & Taris, T. W. (2008). Work engagement: An emerging concept in occupational health psychology. *Work and Stress, 22*, 187–200.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Baron, R. M., & Kenny, D. A. (1986). The moderator and mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173.

Brislin, R. W. (1980). Translation and content analysis of oral and written materials. In H. C. Triandis & J. W. Berry (Eds.), *Handbook of cross-cultural psychology: Methodology* (Vol. 2, pp. 389–444). Boston: Allyn & Bacon.

Carver, C. S., & Scheiver, M. F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.

Carver, C. S., & Scheiver, M. F. (2002). Optimism. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 231–243). New York: Oxford University Press.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*, 233–255.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Hau, K. T., & Marsh, H. W. (2004). The use of item parcels in structural equation modelling: Non-normal data and small sample sizes. *British Journal of Mathematical and Statistical Psychology, 57*, 327–351.

Hobfoll, S. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist, 44*, 513–524.

Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: Advancing conservation of resources theory. *Applied Psychology, 50*, 337–421.

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology, 6*, 307–324.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal, 9*, 151–173.

Lu, C. Q., Siu, O. L., Chen, W. Q., & Wang, H. J. (2011). Family mastery enhances work engagement in Chinese nurses: A cross-lagged analysis. *Journal of Vocational Behavior, 78*, 100–109.

Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior, 23*, 695–706.

Luthans, F., & Youssef, C. M. (2007). Emerging positive organizational behavior. *Journal of Management, 33*, 321–349.

Luthans, F., Youssef, C. M., & Avolio, B. J. (2007). *Psychological capital: Developing the human competitive edge*. New York: Oxford University Press.

Maehr, M. L., & Meyer, H. A. (1997). Understanding motivation and schooling: Where we've been, where we are, and where we need to go. *Educational Psychology Review, 9*, 371–408.

Masten, A. S., & Reed, M. G. J. (2002). Resilience in development. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 74–88). New York: Oxford University Press.

Ouweneel, E., LeBlanc, P. M., & Schaufeli, W. B. (2011). Flourishing students: A longitudinal study on positive emotions, personal resources, and study engagement. *The Journal of Positive Psychology, 6*, 142–153.

Podsakoff, P., MacKenzie, S., Lee, J., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*, 879–903.

Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, and Computers, 36*, 717–731.

Salanova, M., Llorens, S., Cifre, E., Martinez, I. M., & Schaufeli, W. B. (2003). Perceived collective efficacy, subjective well-being, and task performance among electronic work group: An experimental study. *Small Group Research, 34*, 43–73.

Salanova, M., Llorens, S., & Schaufeli, W. B. (2011). Yes, I can. I feel good, and I just do it! On gain cycles and spirals of efficacy beliefs, affect, and engagement. *Applied Psychology: An International Review, 60*, 255–285.

Salanova, M., Schaufeli, W. B., Martinez, I. M., & Breso, E. (2010). How obstacles and facilitators predict academic performance: The mediating role of study burnout and engagement. *Anxiety, Stress, and Coping, 23*, 53–70.

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior, 25*, 293–315.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement, 66*, 701–716.

Schaufeli, W. B., Martinez, I. M., Pinto, A. M., & Bakker, A. B. (2002a). Burnout and engagement in university students: A cross-national study. *Journal of Cross-Cultural Psychology, 33*, 464–481.

Schaufeli, W. B., Salanova, M., Gonzalez-Roma, V., & Bakker, A. B. (2002b). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness Studies, 3*, 71–92.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology, 4*, 219–247.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology, 67*, 1063.

Schwarzer, R., Babler, J., Kwiatek, P., Schroder, K., & Zhang, J. X. (1997). The assessment of optimistic self-beliefs: Comparison of the German, Spanish, and Chinese versions of the general self-efficacy scale. *Applied Psychology: An International Review, 46*, 69–88.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology. *American Psychologist, 55*, 5–14.

Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods, 7*, 422–445.

Siu, O. L. (2002). Occupational stressors and well-being among Chinese employees: The role of organizational commitment. *Applied Psychology: An International Review, 51*(4), 527–544.

Siu, O. L., Hui, C. H., Phillips, D. R., Lin, L., Wong, T., & Shi, K. (2009). A study of resiliency among Chinese health care workers: Capacity to cope with workplace stress. *Journal of Research in Personality, 43*, 770–776.

Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., et al. (1991). The will and the ways: Development and validation of an individual-differences measures of hope. *Journal of Personality and Social Psychology, 60*, 570–585.

Snyder, C. R., Rand, K. L., & Sigmon, D. R. (2002). Hope Theory. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 257–276). New York: Oxford University Press.

Sweetman, D., & Luthans, F. (2010). The power of positive psychology: Psychological capital and work engagement. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (pp. 54–68). East Sussex: Psychology Press.

Vroom, V. H. (1964). *Work and motivation*. New York: John Wiley.

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior, 74*, 235–244.

Zhang, Y., Gan, Y., & Cham, H. (2007). Perfectionism, academic burnout and engagement among Chinese college students: A structural equation modeling analysis. *Personality and Individual Differences, 43*, 1529–1540.