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# Disentangling the Relations Between Self-esteem and Subjective Well-being in Emerging Adults: A Two-wave Longitudinal Study

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## Abstract

Previous studies have found that self-esteem is linked to subjective well-being (SWB), but little is known about the longitudinal relationship between self-esteem and the bi-factor structure of SWB which has been demonstrated to include three specific factors and a general factor of SWB. This study used four competing structural models of SWB (i.e., the three-factor model, the causal model, the hierarchical model and the bi-factor model) to investigate the relationships between self-esteem and SWB in a total of 997 emerging Chinese adults ($M_{age}$ = 19.79 years; 65.20% females) through a two-wave longitudinal study. From the point of view of the fit index, the results showed that the bi-factor model fitted our data better than the other three models. Importantly, results for the vast majority of models demonstrated the existence of the reciprocal link between self-esteem and subjective well-being in emerging Chinese adults. Specially, the results of bi-factor model suggested that there was a bidirectional link between self-esteem and the general factor of subjective well-being. To sum up, our findings provide new support for studying the longitudinal relationship between self-esteem and SWB using four models including the bi-factor model.

Keywords Self-esteem · Subjective well-being · Bi-factor model · Longitudinal study

## 1 Introduction

With the vigorous development of positive psychology, a growing number of investigations have focused on self-esteem (Rosenberg et al., 1995; Bajaj et al., 2016; Kong et al., 2013; Orth & Robins, 2014). Self-esteem is typically defined as an overall evaluation of one's value or worth (Rosenberg et al., 1995; Rosenberg, 1965). Previous research has shown that self-esteem is positively related to health, well-being, academic achievement and occupa-

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tional status (Orth et al., 2009; Bachman & O'Malley, 1977; Padhy et al., 2011; Judge et al., 2009), and negatively associated with criminal behavior, depression, anxiety, hopelessness, suicidal tendencies and attempted suicide (Crandall, 1973; Solomon et al., 1991; Orth et al., 2009; Overholser et al., 1995). In the present study, we would explore the relation between self-esteem and subjective well-being (SWB) through a two-wave longitudinal study.

## 1.1 Stability of Self-esteem and Subjective Well-being

Trzesniewski et al. (2003) found that self-esteem was relatively stable, but the stability tended to change across the life course. Specifically, the stability of self-esteem increased throughout adolescence and young adulthood, and declined during midlife and old age. In addition, several studies have revealed that during young adulthood, emerging adults were inclined to show an increase in self-esteem (Robins et al., 2002; Orth et al., 2010, 2012, 2015).

Subjective well-being is often defined as the subjective judgment of how much people are happy with their own lives (Diener et al., 2003). It is consisted of partially separable cognitive and affective components: life satisfaction (LS), positive affect (PA), and negative affect (NA) (Diener et al., 2017). Similar to self-esteem, subjective well-being appears moderately stable over time, but levels of subjective well-being may still change over time (Lucas, 2007; Costa et al., 1987; Diener et al., 1993). Specifically, several studies have shown that levels of life satisfaction decrease with age during early adulthood (Stone et al., 2010; Blanchflower & Oswald, 2008; Boyce et al., 2013; Steptoe et al., 2015), but positive affect is relatively stable among younger participants whereas negative affect tends to decline (Charles et al., 2001; Mroczek & Kolarz, 1998).

## 1.2 The Link of Self-esteem with Subjective Well-being

The literature on self-esteem indicates a strong link between subjective well-being and self-esteem. On the one hand, the bottom-up model states that satisfaction with specific life domains such as the self can exert a direct influence on global subjective well-being (Diener, 1984; Chmiel et al., 2012). On the other hand, the top-down model specifies that the specific aspects of subjective well-being can be predicted by global subjective well-being (Diener, 1984) which implies that individuals with higher global subjective well-being will be more satisfied with specific life domains such as the self (i.e., higher self-esteem). Furthermore, according to Lent's (2004) general model of normative well-being, if a person feels satisfied and comfortable in specific life domains, his global subjective well-being is likely to be improved, and greater subjective well-being will in turn make a person more satisfied with the specific life domains. That is, there is reciprocity between self-esteem and global subjective well-being. Consistent with these models, a large number of empirical studies have shown that self-esteem is correlated with subjective well-being (Diener, 1984; Padhy et al., 2011; Du et al., 2017; Yu et al., 2016; Karatas & Tagay, 2012). Specifically, numerous studies have found that self-esteem positively associated with positive affect (Padhy et al., 2011; Yu et al., 2016) and life satisfaction (Maluka, 2004; Yildirim et al., 2019), and negatively associated with negative affect (Ozyesil, 2012; Barnett & Ruiz, 2018).

Although there is widespread evidence for the relationship between subjective well-being and self-esteem, most previous studies adopted cross-sectional design. To explore

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the link between subjective well-being and self-esteem deeply, longitudinal studies should be utilized. To our knowledge, there are a few studies that used a longitudinal approach to investigate the link between self-esteem and subjective well-being (Gomez-Baya et al., 2018; Ye et al., 2012; Yang et al., 2019; Kim & Nho, 2020; Orth et al., 2012). For instance, Ye et al. (2012) found that self-esteem was related to subsequent changes in life satisfaction, whereas no significant effect of life satisfaction on subsequent self-esteem was found in Chinese emerging adults. Furthermore, Orth et al. (2012) found that self-esteem was associated with subsequent change in life satisfaction, positive affect and negative affect, but there were no reliable effects of life satisfaction, positive affect and negative affect on later self-esteem in individuals aged from 16 to 97 years. Gomez-Baya et al. (2018) further extended the finding to adolescents. In contrast, Kim and Nho (2020) found a bidirectional relation between self-esteem and life satisfaction in Korean multicultural adolescents. In addition, Yang et al. (2019) found a significant bidirectional relation between self-esteem and total subjective well-being in school at an interval of 18-month in Chinese children. Although these studies have provided new knowledge about the relationship between self-esteem and subjective well-being, there are still some problems to be solved. First, these studies seemed to show inconsistent results. These inconsistent results may be due to the fact that they either calculated the three components of subjective well-being separately or used the total scores of life satisfaction, positive affect and negative affect as a composite subjective well-being index, which cannot allow us to simultaneously evaluate the general and specific effects on the observed indicators. Second, most of these studies did not concern with emerging adulthood (i.e., adults from age 18 to age 25) during which the identity explorations of adolescence continued and even intensified with respect to love, work, and ideology (Erikson, 1968). Importantly, the level of self-esteem has been found to decline from adolescence to young adulthood, and then increase during young adulthood (Robins et al., 2002). Therefore, it is important and necessary to investigate the link between self-esteem and subjective well-being in emerging adulthood. Taking into account the above factors, this study would utilize a two-wave longitudinal study to explore the link between self-esteem and subjective well-being in emerging Chinese adults.

## 1.3 The Models of Subjective Well-being

In the literature, three models are often employed to examine the structure of subjective well-being: the three-factor model, the causal model, and the hierarchical model (or the higher-order latent factor model). In the three-factor model proposed by Diener (1984), subjective well-being is conceptualized as three components (i.e., life satisfaction, positive affect, and negative affect). From the perspective of this model, life satisfaction, positive affect, and negative affect each provide distinct information about the broad topic of subjective well-being, emphasizing the separability of these components. Accordingly, life satisfaction, positive affect, and negative affect should be measured respectively and their associations with external variables (e.g., self-esteem) should be tested respectively. In the causal model, subjective well-being is conceptualized as a causal system in which life satisfaction is seen as an outcome of positive affect and negative affect. Researchers who employed the causal model typically test path models in which positive affect and negative affect are specified as predictors of life satisfaction (Davern et al., 2007; Zou et al., 2013). Therefore, life satisfaction is typically treated as the ultimate subjective well-being out-

come, that is, the "essence" of subjective well-being (Davern et al., 2007). The hierarchical model contains a high-order subjective well-being factor that accounts for the commonality shared by the facets, which consists of three low-order components (e.g., life satisfaction, positive affect and negative affect). The hierarchical model emphasizes the generality of all dimensions of subjective well-being and has been verified in many studies (e.g., Duy and Yıldız, 2019; Linley et al., 2009; Yu et al., 2016). However, these aforementioned models seem to have limitations to capture the multidimensionality of subjective well-being. None of these three models can directly test the extent to which each item can provide unique information on the general and the specific factors respectively (Busseri & Sadava, 2011; García-Cadena et al., 2020).

The bi-factor model (Model 4) is a recently proposed model, which is composed of a general factor (i.e., the general subjective well-being factor) and several specific factors (i.e., life satisfaction, positive affect and negative affect), so that the variance of each item can be explained by both the general and one specific factor (Chen et al., 2012). In this model, the general factor accounts for the common variance which is shared by all the items in the structure, and the specific factors reflect the unique variance belonging to a specific domain of content. Chen et al. (2013) illustrated five advantages of the bi-factor model in testing multifaceted constructs (e.g., subjective well-being), and the central advantage is that it can separate the unique contributions of the specific facets from the effects of the general construct and simultaneously tests the association of an outcome variable with the general latent factor and the unique contributions of the specific factors which are distinct from the general construct (Chen et al., 2012). Conceptually, the bi-factor model, which combines the advantages while avoids the shortcomings, of the three aforementioned models, can provide a synthetic understanding of the relations between life satisfaction, positive affect, negative affect and their associations with important external variables (e.g., self-esteem). Due to this core advantage, the bi-factor model has been applied to various fields, such as personality, intelligence and smartphone addiction (Luo et al., 1994; Bludworth et al., 2010; Vintilă et al., 2018).

As far as we know, the bi-factor model has been employed to measure subjective well-being by several studies (Chen et al., 2013; Yang et al., 2020; Daniel-González et al., 2020; García-Cadena et al., 2020). Although to some extent these studies have shown that the bi-factor model of subjective well-being is better than some other models for representing the construct of subjective well-being, no study has compared the bi-factor model of subjective well-being with three other commonly used models of subjective well-being using the longitudinal design. To date, only a handful of studies have compared three competing structural models of subjective well-being (i.e., the three-factor model, the causal model, and the hierarchical model) but did not include the bi-factor model of subjective well-being (Busseri, 2015; Metler & Busseri, 2017). Moreover, to our knowledge, no cross-sectional or longitudinal studies have investigated the link between self-esteem and the bi-factor construct of subjective well-being. Therefore, it is still not clear whether and how the bi-factor construct of subjective well-being is related to self-esteem.

It is worth noting that before comparing the bi-factor model with other models we must clarify the meaning of the latent factors in each model. In the three-factor model, causal model, and hierarchical model, the latent factors for life satisfaction, positive affect, and negative affect represent the commonality among the scale items serving as indicators for each of the respective factors. In contrast, in the bi-factor model, the latent factors for life

satisfaction, positive affect, and negative affect represent only the covariation among the scale-specific item indicators that remain after controlling for the item loadings on the general subjective well-being factor. Whereas the latent life satisfaction, positive affect, and negative affect factors in the three-factor model, causal model, and hierarchical model can be interpreted in a comparable manner, the versions of these 'specific' factors in the bi-factor model cannot be interpreted in an equivalent manner. In order to make this issue more apparent to all readers, we have renamed these three factors in the Model 4 (i.e., specific latent life satisfaction, positive affect, negative affect).

### 1.4 The Present Study

All in all, the present study would test the relationship between self-esteem and subjective well-being using four subjective well-being models (i.e., the three-factor model, the causal model, the hierarchical model and the bi-factor model) through a two-month longitudinal study with a sample of emerging Chinese adults. Numerous studies have shown that both subjective well-being and self-esteem tend to fluctuate daily (Fosco et al., 2020; Fay & Hüttges, 2017; Thomaes et al., 2017; Bernecker et al., 2017; Zhang & Zheng, 2017; Subrahmanyam et al., 2020; Hepper & Carnelley, 2012; Sowislo et al., 2014), and weekly (Bergstad et al., 2011; Caesens et al., 2016; Bostic & Ptacek, 2001; Batista et al., 2016; Geukes et al., 2016), so it is reasonable to assume that the levels of subjective well-being and self-esteem would change over two months.

Here, we would propose three possible hypotheses. First, according to the bottom-up model (Diener, 1984; Chmiel et al., 2012), self-esteem may be associated with subsequent changes in the structure of subjective well-being (the antecedent model). Second, based on the top-down model (Diener, 1984), the structure of subjective well-being may be associated with an increase in self-esteem (the consequence model). Third, according to the normative well-being model (Lent, 2004), self-esteem is likely to promote subjective well-being, which in turn may nurture self-esteem (the reciprocal predictive model). In addition, based on the advantages of the bi-factor model, we also expected that the bi-factor model would fit our data better and provide more information about the relationship between self-esteem and subjective well-being.

## 2 Method

### 2.1 Participants and Procedure

This study is part of our project investigating well-being in adulthood. Participants were instructed to undertake a series of online questionnaires which mainly assess one's socio-economic status, positive traits (i.e., emotional intelligence, self-esteem, psychological resilience), social support system and well-being. Data that are not relevant to the theme of this study were not reported here. At time 1(T1), 1112 Chinese undergraduates from three universities in different regions of China (northwest, northeast, and southwest) participated in the baseline assessment. All the participants took part in this study via a questionnaire survey website (http://www.wjx.cn). After a two-month interval, a total of 1068 students were tested at Time 2 (T2). Due to the missing data, the responses of 997 (93.35% of the

1068 followed-up) students (mean age at T1 = 19.79, *SD* = 1.31; 65.20% females) were used to performed subsequent analysis. All participants volunteered to participate in the study, signed informed consent before the study began. This research was approved by the ethics committee of local university.

## 2.2 Measures

### 2.2.1 Self-esteem

Self-esteem was measured using a 4-item short form of the Rosenberg Self-Esteem Scale (Edmondson et al., 2015), modified from the original 10-item Rosenberg Scale (1965). Each item is scored on a Likert scale ranging from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*) with statements such as "*I feel I have many good qualities.*" The Cronbach alpha coefficients for this scale were 0.783 at T1 and 0.824 at T2.

### 2.2.2 Satisfaction with Life Scale (SWLS)

The Satisfaction with Life Scale (Diener et al., 1985) was used to measure life satisfaction. It includes 5 items (e.g., "*My life is close to my ideal in most respects*"), and items are evaluated on a 7-point Likert scale from 1 being "*Strongly Disagree*" to 7 being "*Strongly Agree*". Good reliability and validity of the SWLS have been found in Chinese culture (Kong et al., 2019; Kong & You, 2013; Li et al., 2022; Wang et al., 2020; Zhang et al., 2022). The Cronbach alpha coefficients of the scale in the current study were found as 0.832 at T1 and 0.858 at T2.

### 2.2.3 The Scale of Positive and Negative Experience (SPANE)

The SPANE was used to measure the affective component of subjective well-being (Diener et al., 2010). It includes 6 one-word items for positive affect (e.g. "*Positive*" or "*Happy*") and 6 items for negative affect (e.g., "*Negative*", "*Sad*"). Items are rated on a scale ranging from 1 being "*very rarely or never*" to 5 being "*very often or always*". Good reliability and validity of the SPANE were found in Chinese culture (Li et al., 2023; Tong & Wang, 2017). The Cronbach alpha coefficients of the positive affect and negative affect subscale in this study were 0.921 and 0.877 at T1, and 0.948 and 0.894 at T2, respectively.

## 2.3 Statistical Analysis

We used SPSS 25.0 and Mplus 8.0 to analyze the data. First, descriptive statistics and correlations were conducted using the SPSS 25.0 and Mplus 8.0 to test the correlations among the major variables and major latent variables, respectively. Second, in order to investigate the link between self-esteem and subjective well-being, the structural equation modeling (SEM) procedure was employed to evaluate a cross-lagged panel model (CLPM) between self-esteem and subjective well-being using Mplus 8.0. We built four subjective well-being models (i.e., the three-factor model, the causal model, the hierarchical model and the bi-factor model) and all the models were analyzed based on the item-level. The standardized

factor loadings for all items on each latent factor from each model were presented in the Supplemental Tables S1-S4.

First, we established the three-factor model in which subjective well-being is treated as three separate (but correlated) components (i.e., life satisfaction, positive affect, and negative affect) together predict, and are predicted by self-esteem (see Fig. 1). In the model, auto-regressive effects between these four latent variables (i.e., life satisfaction, positive affect, negative affect and self-esteem) were also included. Factor loadings were freely estimated, and factor variances and factor means were set to 1 and 0, respectively. Correlations among the four latent variables were estimated at Time 1. In addition, correlations among the within-time residual variances in the four latent variables were also estimated at Time 2.

Second, we established the causal model in which latent life satisfaction, positive affect, negative affect and self-esteem variables at Time 1 are specified as correlated, simultaneous predictors of each Time 2 latent variable (see Fig. 2). Correlations among the within-time residual variances of the four ratings (self-esteem, life satisfaction, positive affect, negative affect) were estimated at Time 2. Factor loadings were freely estimated, and factor variances and factor means were set to 1 and 0, respectively.

Third, the hierarchical model was built. In the model, subjective well-being was treated as a higher-order latent factor with three low-order indicators (life satisfaction, positive affect, and negative affect) and self-esteem was predicted by and predicts the latent subjective well-being factor over time (see Fig. 3). Factor loadings were freely estimated, and factor variances and factor means were set to 1 and 0, respectively. Correlations were estimated between latent subjective well-being and latent self-esteem factors at Time 1, and between the residual variances in the latent subjective well-being and self-esteem factors at Time 2.

Finally, in the bi-factor model, we examined the saturated structural model which includes all auto-regressive and cross-lagged effects between the two constructs to investigate the link between self-esteem and four factors of subjective well-being (latent life
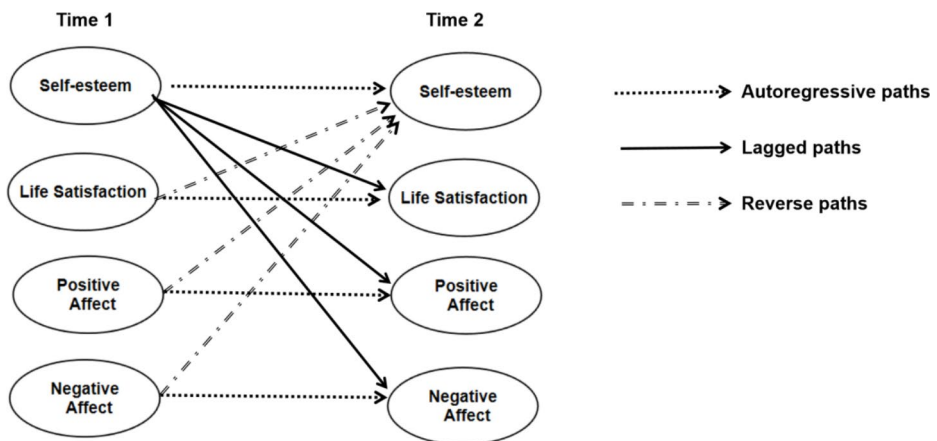


**Fig. 1** Cross-lagged model between self-esteem and the three-factor structure of SWB
*Note*. The saturated structural model was tested to explore the link between self-esteem and SWB including life satisfaction, negative affect and positive affect. Autoregressive paths represent the stability of each variable over time; lagged-paths represent the relation between self-esteem at T1 and the three factors of SWB at T2; reverse paths represent the relation between the three factors of SWB at T1 and self-esteem at T2. All paths are included in saturated structural model which represents the reciprocal relation between self-esteem and the three-factor structure of SWB.
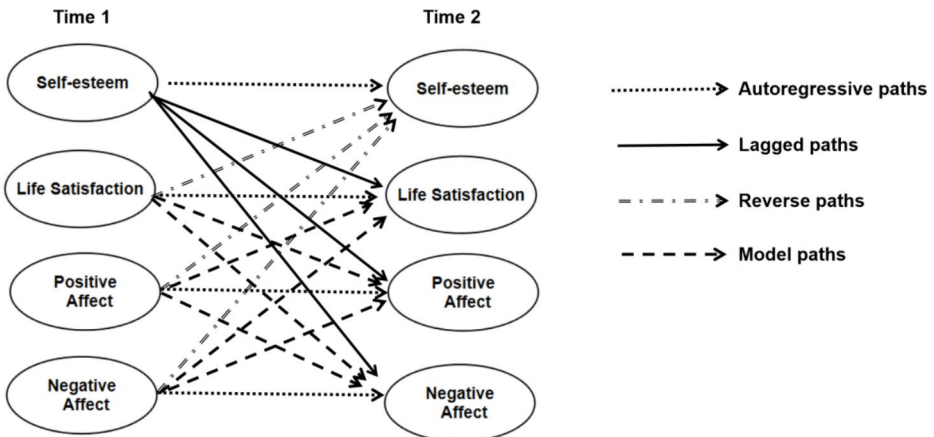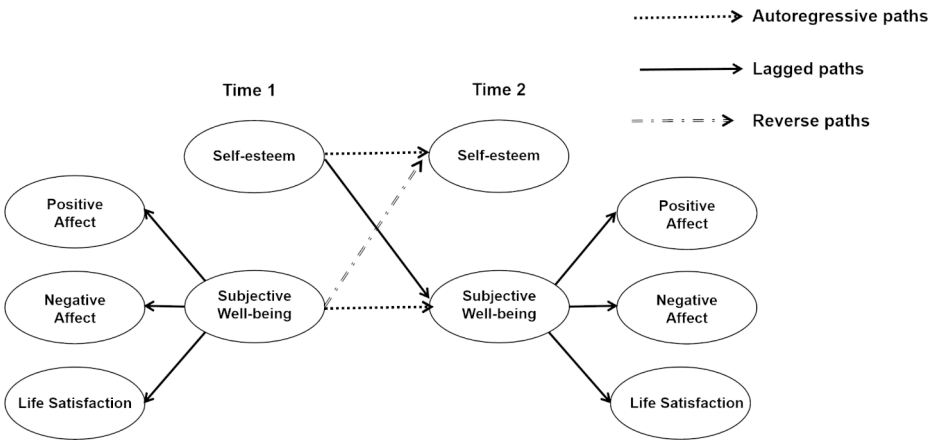
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**Fig. 2** Cross-lagged model between self-esteem and the causal structure of SWB
*Note*. The saturated structural model was tested to explore the link between self-esteem and SWB including life satisfaction, negative affect and positive affect. Autoregressive paths represent the stability of each variable over time; lagged-paths represent the relation between self-esteem at T1 and the four factors of SWB at T2; reverse paths represent the relation between the three factors of SWB at T1 and self-esteem at T2; model paths represent the assumptions of the causal model. All paths are included in saturated structural model which represents the reciprocal relation between self-esteem and the causal structure of SWB.



**Fig. 3** Cross-lagged model between self-esteem and the hierarchical structure of SWB
*Note*. The saturated structural model was tested to explore the link between self-esteem and second order latent SWB. Autoregressive paths represent the stability of each variable over time; lagged-paths represent the relation between self-esteem at T1 and the latent SWB at T2; reverse paths represent the relation between the latent SWB at T1 and self-esteem at T2. All paths are included in saturated structural model which represents the reciprocal relation between self-esteem and the hierarchical structure of SWB.

satisfaction, positive affect, negative affect and the general subjective well-being factor; see Fig. 4). We freely estimated the factor loadings. The correlations between four factors of subjective well-being at each time point were specified as 0 according to the features of the bi-factor model that the general and specific factors are all orthogonal to each other (Chen
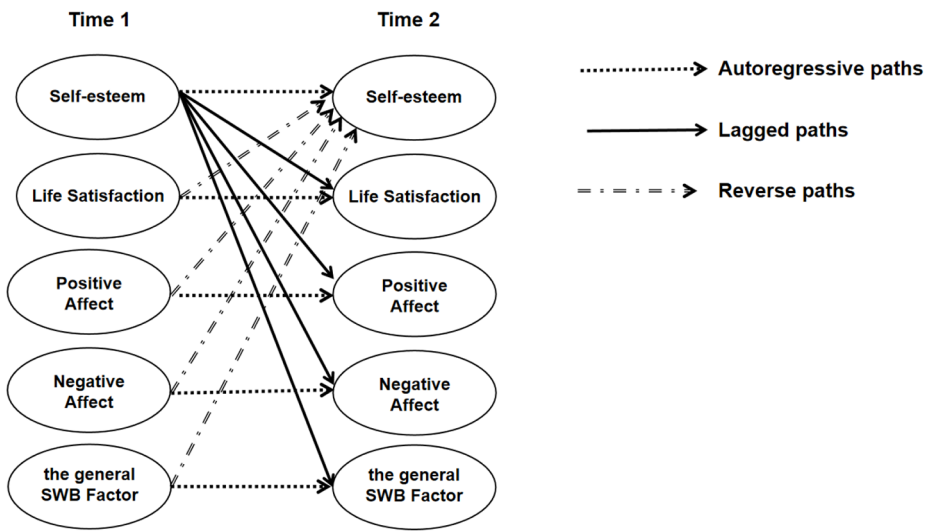
**Fig. 4** Cross-lagged model between self-esteem and the bi-factor structure of SWB
*Note*. The saturated structural model was tested to explore the link between self-esteem and SWB including life satisfaction, negative affect, positive affect and the general SWB factor. Autoregressive paths represent the stability of each variable over time; lagged-paths represent the relation between self-esteem at T1 and the four factors of SWB at T2; reverse paths represent the relation between the four factors of SWB at T1 and self-esteem at T2. All paths are included in saturated structural model which represents the reciprocal relation between self-esteem and the bi-factor structure of SWB.

et al., 2006, 2012). To identify the model, in addition to setting factor variances to 1, factor means were also set to 0.

Model fit was analyzed employing multiple indicators: the comparative fit index (CFI), the Tucker–Lewis index (TLI), the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). The model fit is regarded as acceptable if the CFI and TLI are above 0.90, and the SRMR and RMSEA are less than 0.08. If CFI and TLI≥0.95, SRMR and RMSEA≤0.06, the fit of the model will be regarded as good (Hu & Bentler, 1999). To analyze the model fit, we also employed the Akaike information criteria (AIC) and the Bayesian information criteria (BIC), which compare the information explained by the nested models—the lower its value, the preferred should be the model (Kline, 2011). Given that the χ2 statistic is sensitive to sample size (Davey, 2009), it was just reported, but not used to assess the fit of the model. The datasets and code generated during and/or analysed during the current study are available at: https://osf.io/5vbe7/.

## 3 Results

### 3.1 Descriptive Statistics and Bivariate Correlations

Means, standard deviations, and inter-correlation for each variable at T1 and T2 were presented in Table 1. At T1 and T2, negative affect was negatively correlated with self-esteem, positive affect and life satisfaction, and significant positive correlations were found between

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**Table 1** Descriptive statistics and correlations for the main variables based on the composite scale scores

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1.life satisfaction$_{T1}$ | - | | | | | | | |
| 2.positive affect$_{T1}$ | 0.50** | - | | | | | | |
| 3.negative affect$_{T1}$ | −0.22** | −0.40** | - | | | | | |
| 4.self-esteem$_{T1}$ | 0.42** | 0.52** | −0.42** | - | | | | |
| 5.life satisfaction$_{T2}$ | 0.54** | 0.39** | −0.22** | 0.38** | - | | | |
| 6.positive affect$_{T2}$ | 0.32** | 0.49** | −0.26** | 0.38** | 0.59** | - | | |
| 7.negative affect$_{T2}$ | −0.19** | −0.27** | 0.42** | −0.26** | −0.36** | −0.52** | - | |
| 8.self-esteem$_{T2}$ | 0.34** | 0.41** | −0.30** | 0.53** | 0.50** | 0.58** | −0.45** | - |
| M | 20.30 | 22.02 | 14.95 | 12.10 | 22.26 | 22.63 | 14.02 | 12.45 |
| SD | 5.46 | 3.77 | 3.93 | 2.00 | 5.38 | 4.01 | 3.83 | 2.03 |

Note. TI, Time 1; T2, Time 2; **p<.01

**Table 2** Correlations among the latent factors based on the bi-factor model

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.life satisfaction$_{T1}$ | - | | | | | | | | | |
| 2.positive affect$_{T1}$ | 0 | - | | | | | | | | |
| 3.negative affect$_{T1}$ | 0 | 0 | - | | | | | | | |
| 4.gSWB$_{T1}$ | 0 | 0 | 0 | - | | | | | | |
| 5.self-esteem$_{T1}$ | 0.15** | 0.02 | −0.23** | 0.64** | - | | | | | |
| 6.life satisfaction$_{T2}$ | 0.51** | 0.01 | -0.01 | 0.13* | 0.23** | - | | | | |
| 7.positive affect$_{T2}$ | −0.13* | 0.13 | 0.11 | 0.1 | 0.04 | 0 | - | | | |
| 8.negative affect$_{T2}$ | 0.01 | 0.05 | 0.38** | -0.02 | -0.06 | 0 | 0 | - | | |
| 9.gSWB$_{T2}$ | 0.11* | 0.12* | -0.08 | 0.51** | 0.44** | 0 | 0 | 0 | - | |
| 10.self-esteem$_{T2}$ | 0.16*** | 0.08 | −0.14** | 0.47** | 0.66** | 0.18** | 0.03 | −0.14** | 0.68** | - |

Note. gSWB, the general factor of subjective well-being; TI, Time 1; T2, Time 2; *p<.05; **p<.01.

self-esteem, positive affect and life satisfaction (self-esteem, positive affect and life satisfaction were positively correlated with each other). As is presented in Table 2, at both T1 and T2, self-esteem was positively correlated with the general subjective well-being factor and life satisfaction, and significant negative correlations were found between self-esteem and negative affect. There was no significant correlation between self-esteem and positive affect.

### 3.2 Results for the Three-factor Model

This model provided acceptable global fit ( see Table 3). As Table 4 presented, all variables were moderate stable across a two-month interval (stability coefficients ranged 0.35 to 0.54, $ps<0.001$). Based on the results of the three-factor model, self-esteem at Time 1 was associated with the changes in positive affect, negative affect and life satisfaction at Time 2 (for positive affect: $\beta=0.24$, $p<.001$; for negative affect: $\beta=−0.14$, $p<.01$; for life satisfaction: $\beta=0.27$, $p<.001$). And there was a bidirectional relationship between self-esteem and life satisfaction ($\beta=0.08$, $p<.05$). All other paths were non-significant. There were also moderate correlations among self-esteem, life satisfaction, positive affect, and negative affect at Time 1 ($rs=0.54, 0.56, −0.53, 0.58, −0.32$ and $−0.45$, respectively for correlations between self-esteem and life satisfaction, self-esteem and positive affect, self-esteem and negative

**Table 3** Fit indices of the tested models

| Model | $\chi^2(df)$ | CFI | TLI | RMSEA | SRMR | AIC | BIC |
|---|---|---|---|---|---|---|---|
| Three-factor model | 2297.533(776) | 0.929 | 0.921 | 0.044 | 0.047 | 79586.219 | 80415.122 |
| Causal model | 2288.001(770) | 0.929 | 0.921 | 0.044 | 0.045 | 79586.869 | 80445.200 |
| Hierarchical model | 2513.305(786) | 0.919 | 0.912 | 0.047 | 0.057 | 79837.441 | 80617.297 |
| Bi-factor model | 1866.231(743) | 0.948 | 0.939 | 0.039 | 0.036 | 79060.098 | 80050.858 |

*Note.* CFI, comparative fit index; TLI, Tucker–Lewis index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; AIC, Akaike information criteria; BIC, Bayesian information criteria.

**Table 4** Overview of the standardized stability and cross-lagged coefficient based on the three-factor model, the causal model and the hierarchical model

| Model | Autoregressive path | $\beta$ | Cross-lagged path | $\beta$ |
|---|---|---|---|---|
| Three-factor model | $SE_{T1} \rightarrow SE_{T2}$ | 0.54*** | $SE_{T1} \rightarrow LS_{T2}$ | 0.27*** |
| | $LS_{T1} \rightarrow LS_{T2}$ | 0.43*** | $SE_{T1} \rightarrow PA_{T2}$ | 0.24*** |
| | $PA_{T1} \rightarrow PA_{T2}$ | 0.35*** | $SE_{T1} \rightarrow NA_{T2}$ | −0.14** |
| | $NA_{T1} \rightarrow NA_{T2}$ | 0.38*** | $LS_{T1} \rightarrow SE_{T2}$ | 0.08* |
| | | | $PA_{T1} \rightarrow SE_{T2}$ | 0.05 |
| | | | $NA_{T1} \rightarrow SE_{T2}$ | −0.02 |
| Causal model | $SE_{T1} \rightarrow SE_{T2}$ | 0.50*** | $SE_{T1} \rightarrow LS_{T2}$ | 0.21*** |
| | $LS_{T1} \rightarrow LS_{T2}$ | 0.44*** | $SE_{T1} \rightarrow PA_{T2}$ | 0.18*** |
| | $PA_{T1} \rightarrow PA_{T2}$ | 0.38*** | $SE_{T1} \rightarrow NA_{T2}$ | −0.05 |
| | $NA_{T1} \rightarrow NA_{T2}$ | 0.38*** | $LS_{T1} \rightarrow SE_{T2}$ | 0.12* |
| | | | $PA_{T1} \rightarrow SE_{T2}$ | 0.09 |
| | | | $NA_{T1} \rightarrow SE_{T2}$ | −0.03 |
| | | | $LS_{T1} \rightarrow PA_{T2}$ | 0.06 |
| | | | $LS_{T1} \rightarrow NA_{T2}$ | −0.09 |
| | | | $PA_{T1} \rightarrow LS_{T2}$ | 0.07 |
| | | | $PA_{T1} \rightarrow NA_{T2}$ | −0.05 |
| | | | $NA_{T1} \rightarrow LS_{T2}$ | −0.01 |
| | | | $NA_{T1} \rightarrow PA_{T2}$ | −0.01 |
| Hierarchical model | $SE_{T1} \rightarrow SE_{T2}$ | 0.38*** | $SE_{T1} \rightarrow SWB_{T2}$ | −0.09 |
| | $SWB_{T1} \rightarrow SWB_{T2}$ | 0.82*** | $SWB_{T1} \rightarrow SE_{T2}$ | 0.31*** |

*Note.* PA, positive affect; NA, negative affect; LS, life satisfaction; SE, self-esteem; T1, Time 1; T2, Time 2; $\beta$, standardized coefficient. *$p<.05$, **$p<.01$, ***$p<.001$.

affect, life satisfaction and positive affect, life satisfaction and negative affect, and positive affect and negative affect; $ps<0.001$), as well as moderate correlations among the residual variances in self-esteem, life satisfaction, positive affect, and negative affect at Time 2: $rs=0.44, 0.51, −0.45, 0.55, −0.35$ and $−0.51$, respectively, $ps<0.001$.

### 3.3 Results for the Causal Model

Model fit indices of the causal model indicated an acceptable fit to the data (see Table 3). Compared to the three-factor model, we can find that no significant changes in the global fit indices were found ($\Delta$CFI$=0.000$, $\Delta$TLI$=0.000$, $\Delta$RMSEA$=0.000$ and $\Delta$SRMR$=−0.002$. But the AIC and BIC values of the three-factor model were lower than the values of the

causal model ($\Delta$AIC$=0.650$ and $\Delta$BIC$=30.078$), so the three-factor model might fit our data better. As Table 4 presented, all these variables were stable concerning the time span of 2 months (stability coefficients ranged 0.38 to 0.50, $p$s$<0.001$). Based on the results of the causal model, self-esteem at Time 1 was associated with the changes in positive affect and life satisfaction at Time 2 (for positive affect: $\beta=0.18$, $p<.001$; for life satisfaction: $\beta=0.21$, $p<.001$). And there was a bidirectional relationship between self-esteem and life satisfaction ($\beta=0.12$, $p<.05$). All other paths were non-significant (including the paths from positive affect and negative affect at Time 1 to life satisfaction at Time 2). These findings cannot provide adequate support for the causal model because negative affect and positive affect at Time 1 were not associated with increases in life satisfaction at Time 2. In addition, there were also moderate correlations among self-esteem, life satisfaction, positive affect, and negative affect at Time 1 ($r$s$=0.54$, $0.55$, $-0.52$, $0.58$, $-0.32$ and $-0.45$, respectively for correlations between self-esteem and life satisfaction, self-esteem and positive affect, self-esteem and negative affect, life satisfaction and positive affect, life satisfaction and negative affect, and positive affect and negative affect; $p$s$<0.001$), as well as moderate correlations among the residual variances in self-esteem, life satisfaction, positive affect, and negative affect at Time 2: $r$s$=0.44$, $0.52$, $-0.45$, $0.55$, $-0.35$ and $-0.51$, respectively, $p$s$<0.001$.

### 3.4 Results for the Hierarchical Model

Model fit indices of the hierarchical model indicated less acceptable fit to the data (see Table 3). Compared to the three-factor model, we can find that the hierarchical model had worse performance in all the fit indices ($\Delta$CFI$=-0.010$, $\Delta$TLI$=-0.009$, $\Delta$RMSEA$=0.003$, $\Delta$SRMR$=0.010$, $\Delta$AIC$=251.222$ and $\Delta$BIC$=202.175$), so the three-factor model might fit our data better. Self-esteem had a moderate stability and subjective well-being had a high stability across two-month interval ($\beta$s$=0.38$ and $0.82$, respectively for self-esteem and subjective well-being; $p<.001$). Based on the results of hierarchical model (see Table 4), selfesteem at Time 1 could not predict subjective well-being at Time 2 ($\beta=0.09$, $p>.05$), but subjective well-being at Time 1 could predict self-esteem at Time 2 ($\beta=0.31$, $p<.001$). Further, the correlation between the latent subjective well-being and self-esteem factors at Time 1 was significant ($r=.77$, $p<.001$). And there was also significant residual correlation between latent self-esteem and the latent subjective well-being at Time 2: $r=.70$, $p<.001$.

### 3.5 Results for the Bi-factor Model

Next, the stability and cross-lagged effects between specific latent life satisfaction, negative affect, positive affect, self-esteem and the general subjective well-being factor were tested. The cross-lagged effect is the predictive effect of one variable on the others after being controlled for the stability of two variables over time (Cole, & Maxwell, 2003). Model fit indices of the saturated structural model indicated an acceptable to good fit to the data (see Table 3). Compared to the three-factor model, we found that the bi-factor model fitted the data better ($\Delta$CFI$=0.019$, $\Delta$TLI$=0.018$, $\Delta$RMSEA$=-0.005$, $\Delta$SRMR$=-0.011$, $\Delta$AIC $= -526.121$ and $\Delta$BIC $= -364.264$).

Moreover, standardized stability and cross-lagged coefficients were reported in Table 5. First, as presented in Table 3, all measures had significant stability effects, suggesting that these variables were stable concerning the time span of 2 months.

Second, as to the lagged pathways from self-esteem at T1 to the four factors of subjective well-being ( specific latent life satisfaction, positive affect, negative affect and the general subjective well-being factor) at T2, the results showed that self-esteem at T1 was associated with increases in both specific latent life satisfaction ($\beta=0.22, p<.001$) and the general subjective well-being factor ($\beta=0.15, p<.05$) at T2, but it did not relate to changes in specific latent positive affect ($\beta=0.03, p>.05$) and specific latent negative affect ($\beta=0.02, p>.05$) at T2. This indicated that self-esteem was associated with increases in both specific latent life satisfaction and the general subjective well-being factor over time.

Third, as to reverse paths from the four factors of subjective well-being at T1 to self-esteem at T2, we found that the general subjective well-being factor at T1 was related to the change in self-esteem at T2 ($\beta=0.16, p<.05$), while no significant effect was found in all other cross-lagged pathways. That is, only the general subjective well-being factor was associated with the change in self-esteem over time.

To sum up, the results revealed that self-esteem at T1 was related to increases in both specific latent life satisfaction and the general subjective well-being factor at T2, but it was not associated with changes in specific latent positive affect and negative affect at T2. In addition, we also discovered the reciprocal relation between self-esteem and the general factor of subjective well-being.

## 4 Discussion

The primary aim of the present study is to provide a more detailed and thorough understanding of the relationship between subjective well-being and self-esteem. Thus, we conducted a longitudinal study to explore the relationship between self-esteem and subjective well-being using four competing structural models of subjective well-being (i.e., the three-factor model, the causal model, the hierarchical model and the bi-factor model) in emerging adults from three different universities in China. From the point of view of the fit index, the results showed that the bi-factor model fitted our data better than the other three models. More importantly, the bi-factor model seems to provide more information about the relationship between self-esteem and subjective well-being (e.g., self-esteem at T1 was associated with

**Table 5** Overview of the standardized stability and cross-lagged coefficient based on the bi-factor model

| Part | Autoregressive path | $\beta$ | Part | Cross-lagged path | $\beta$ |
|------|---------------------|---------|------|-------------------|---------|
| Part 1 | $SE_{T1} \rightarrow SE_{T2}$ | 0.51*** | Part 2 | $SE_{T1} \rightarrow LS_{T2}$ | 0.22*** |
| | $LS_{TI} \rightarrow LS_{T2}$ | 0.45*** | | $SE_{T1} \rightarrow PA_{T2}$ | 0.03 |
| | $PA_{TI} \rightarrow PA_{T2}$ | 0.23** | | $SE_{T1} \rightarrow NA_{T2}$ | 0.02 |
| | $NA_{TI} \rightarrow NA_{T2}$ | 0.39*** | | $SE_{T1} \rightarrow gSWB_{T2}$ | 0.15* |
| | $gSWB_{TI} \rightarrow gSWB_{T2}$ | 0.46*** | | | |
| | | | Part 3 | $LS_{T1} \rightarrow SE_{T2}$ | 0.06 |
| | | | | $PA_{T1} \rightarrow SE_{T2}$ | 0.02 |
| | | | | $NA_{T1} \rightarrow SE_{T2}$ | −0.01 |
| | | | | $gSWB_{T1} \rightarrow SE_{T2}$ | 0.16* |

*Note.* Part 1, the autoregressive part; Part 2, the normal relation part; Part 3, the reverse relation part; PA, positive affect; NA, negative affect; LS, life satisfaction; SE, self-esteem; gSWB, the general subjective well-being factor; TI, Time 1; T2, Time 2; $\beta$, standardized coefficient. *$p<.05$, **$p<.01$, ***$p<.001$.

increases in specific latent life satisfaction and the general subjective well-being factor). To our knowledge, this study is the first to explore the relationship between self-esteem and subjective well-being in emerging Chinese adults using the bi-factor model of subjective well-being, and is also the first attempt to simultaneously build the bi-factor model of subjective well-being and three other commonly used models of subjective well-being to explore the relationship between self-esteem and subjective well-being through a longitudinal design.

### 4.1 Stability and Factor Loading of Self-esteem and Subjective Well-being

In our study, we found that the stability of self-esteem was moderate over two months (stability coefficients ranged from 0.38 to 0.54). This is consistent with previous studies. For example, Trzesniewski et al. (2003) found the stability of self-esteem increased throughout adolescence and young adulthood. In addition, several studies have revealed that during this period, levels of self-esteem tend to increase with age (Robins et al., 2002; Orth et al., 2010, 2012, 2015). Taken together, these results suggest that although self-esteem is relatively stable, self-esteem tends to fluctuate over time.

As to well-being, we found that the stability coefficients of positive affect (stability coefficients ranged from 0.35 to 0.38), negative affect (stability coefficients ranged from 0.38 to 0.39), and life satisfaction (stability coefficients ranged from 0.43 to 0.44), were moderate over two months. This is in line with previous studies on young adulthood. For instance, Ehrhardt et al. (2000) found that the mean year-to-year correlation of life satisfaction during ten years was 0.44 in young adults. Ye et al. (2012) found that the stability of life satisfaction was 0.42 over eight months in young adults. Ranta et al. (2013) found that nearly half of young adults (41%) had a moderate-stable life satisfaction trajectory throughout this period. Watson and Walker (1996) obtained the stability coefficients for positive affect and negative affect ranging from 0.36 to 0.46 over approximately 6–7 years in young adults. Vaidya et al. (2008) found the range of stability coefficients for positive affect was from 0.41 to 0.52 in a young adult sample during 2.5 years.

However, we found that the stability coefficients and factor loadings of the latent factors in the bi-factor model were quite different from the results of the other three models. Specifically, on the one hand, the stability coefficient of the specific latent positive affect factor in the bi-factor model ($\beta = 0.23$, $p < .01$) was obviously smaller than the stability coefficients of latent positive affect factor in three-factor model ($\beta = 0.35$, $p < .01$) and causal model ($\beta = 0.38$, $p < .01$). On the other hand, the stability coefficient of the general subjective well-being factor in bi-factor model ($\beta = 0.46$, $p < .001$) was dramatically different from the stability coefficient of the higher-order latent subjective well-being factor in the hierarchical model ($\beta = 0.82$, $p < .001$). Furthermore, the three-factor model, causal model, and hierarchical model all have strong factor loadings for the items on their respective factors (see Supplemental Tables), and the standardized factor loadings for the items on their respective factors are relatively consistent across these models. But the standardized factor loadings on the specific latent life satisfaction, positive affect, and negative affect factors are dramatically smaller in magnitude in bi-factor model (vs. the other three models).

These differences are not surprising because, as mentioned above, in the three-factor model, causal model, and hierarchical model, the latent factors for life satisfaction, positive affect, and negative affect represent all of the covariance among the scale items serving as

indicators for each of the respective factors. And the higher-order latent subjective well-being factor in the hierarchical model explains the correlations among the first-order factors and only indirectly influences the measured variables. In contrast, the bi-factor model is non-hierarchical, and it specifies that a single general factor directly accounts for some of the common variance on each measured item and that a set of orthogonal "specific" factors accounts for additional common variance among measured items within subdomains. In other words, the general factor reflects what is common among the items and represents the individual differences on the target dimension that a researcher is most interested in (i.e., subjective well-being). These specific factors represent common factors measured by the items that potentially explain item response variance not accounted for by the general factor. Thus, a chief virtue of the bi-factor model is that it allows researchers to retain a goal of measuring a single common latent trait, but also models, and thus controls for, the variance that arises due to additional common factors. Therefore, the specific latent factors for life satisfaction, positive affect, and negative affect represent only the covariation among the scale-specific item indicators that remain after controlling for the item loadings on the general subjective well-being factor. And the general subjective well-being factor represents the commonality among all the subjective well-being scale items serving as indicators. That is, both the general subjective well-being factor and the specific latent factors represent partial variance - rather than all of the variance, as in the first three models (e.g., the hierarchical model).

## 4.2 The Relation Between Self-esteem and the Subjective Well-being

The results of the three-factor model and the causal model revealed that self-esteem at T1 was associated with the changes in positive affect and life satisfaction at T2 and there was a bidirectional relationship between self-esteem and life satisfaction. Surprisingly, however, the results of the hierarchical model only found that subjective well-being at T1 was associated with the changes in self-esteem at T2, and there was not a bidirectional relationship between self-esteem and the second-order latent subjective well-being factor. This is a very different pattern of results compared to the other models. As mentioned above, the hierarchical model had a poorer fit to the data compared to the other three models. Besides, Canivez (2016) has pointed out that because the influence of higher-order factors on observed indicators is fully mediated by the first-order factors, the question may be raised as to how much of the influence the second-order factors have on the observed indicators is obscured. In the view of Gignac (2007), in practice, this complete mediation may not be a realistic expectation for many inter-covariance matrices to conform to in individual differences research. Therefore, we speculate that these issues may be responsible for the different patterns of results.

To some extent, the bi-factor model reached the similar conclusion with the three-factor model. Specifically, in the bi-factor model, self-esteem was associated with increases in both the specific life satisfaction and the general subjective well-being factor at Time 2 and there was a bidirectional relationship between self-esteem and the general subjective well-being factor. In addition, compared with the other three models, the bi-factor model separated the general contribution and unique contribution of life satisfaction, positive affect and negative affect, and thus we can get a more comprehensive and in-depth understanding of the relations between self-esteem and subjective well-being. For example, in the three-factor model

and the causal model, there was a bidirectional relationship between self-esteem and life satisfaction. Although, the specific latent factors in the bi-factor model cannot be interpreted in an equivalent manner with life satisfaction, positive affect, and negative affect factors in the first three model. But the results did not conflict with the results of the bi-factor model, and we can obtain a deeper understanding by combining the results of the bi-factor model. These together indicated that self-esteem at T1 was related to increases in the specific contribution of life satisfaction and the general contribution of all subjective well-being factors (positive affect, negative affect, life satisfaction) at T2. Moreover, to some extent, the bidirectional relationship between self-esteem and life satisfaction is actually the bidirectional relationship between self-esteem and the general factor of subjective well-being.

In our study, the results of the bi-factor model indicated that self-esteem was positively associated with changes in the specific latent life satisfaction factor and the general subjective well-being factor in emerging Chinese adults (the antecedent model). And results from the three-factor model and the causal model also revealed that there was a bidirectional relation between self-esteem and subjective well-being. These results were in line with the research by Yang et al. (2019) who found that self-esteem was related to change in subsequent subjective well-being which was evaluated via a composite measure of subjective well-being in Chinese elementary school students. As mentioned earlier, previous studies have indicated that a composite measure of subjective well-being employed by Yang et al. (2019) and the three-factor model of subjective well-being adopted by Gomez-Baya et al. (2018), Orth et al. (2012), Ye et al. (2012) and Kim and Nho (2020) are not appropriate to get a more comprehensive and in-depth understanding of the relations between self-esteem and subjective well-being. By combining the bi-factor model of subjective well-being, we can better explain the variance of the set of items (Chen et al., 2013; Kyriazos et al., 2018; García-Cadena et al., 2020).

Therefore, our findings have a advantage to clarify the effect of self-esteem on subjective well-being. In addition, all results except for the hierarchical model were consistent with the bottom-up model of subjective well-being which states that satisfaction with the self and individual life domains like self-esteem exerts a direct impact on global subjective well-being. However, in our study, we found that self-esteem was a positive predictor of the specific latent life satisfaction factor and the general subjective well-being factor, but not the specific latent positive affect and negative affect. This is an interesting and important finding since it casts a new light on the relation between self-esteem and the general factor and the specific factors of subjective well-being.

Importantly, the current study directly tested the reciprocal link between self-esteem and different constructs of subjective well-being especially the bi-factor construct of subjective well-being in emerging Chinese adults, which has never been examined in previous studies. Results for the vast majority of models demonstrated the existence of the reciprocal link between self-esteem and subjective well-being in emerging Chinese adults (the reciprocal predictive model). Specially, the results of bi-factor model suggested that there was a bidirectional link between self-esteem and the general factor of subjective well-being. Therefore, our findings strongly supported the normative well-being model (Lent, 2004), according to which feeling satisfied and comfortable within one's central life domains (e.g., self-esteem) is possible to increase levels of subjective well-being, which in turn, will make a person more satisfied with specific life domains. That is, as individuals' self-esteem improves, their levels of subjective well-being increase, which in turn enhances self-esteem.

In addition, only the general subjective well-being factor related to subsequent changes in self-esteem, whereas specific factors of life satisfaction, positive affect and negative affect did not, suggesting only the general subjective well-being factor but not the unique contributions of the specific factors play an important role in the development of self-esteem. In conclusion, this is the first time to investigate the link between self-esteem and the bi-factor construct of subjective well-being from a longitudinal perspective.

### 4.3 Limitations

However, the current study has several limitations which should be noted. Firstly, although the scales had been found to have good reliability and validity, the results of the current study were based on the self-report method. Therefore, other evaluation methods (e.g., parent-report and experimental methods) should be adopted in further studies. Secondly, previous studies have suggested the big five personality traits are related to self-esteem and well-being, so further studies should explore whether the reciprocal relationship between self-esteem and the bi-factor structure of subjective well-being can be influenced by the big five personality traits. Thirdly, our sample was unbalanced on gender (65.20% females), which may affect the generality of our results. Future research should balance gender ratios to validate our findings. Fourthly, although the random intercept cross-lagged panel model (RI-CLPM, Hamaker et al., 2015) can distinguish the interpersonal effects and intrapersonal effects in each observed score, it requires at least three waves of data. Given our data, the CLPM was more appropriate in the current study since it only required two sets of wave data. Therefore, the CLPM was employed instead of the RI-CLPM in this study. However, it is necessary to utilize more and diverse time lags in further studies because the present findings with two waves of data cannot adequately account for the stability in self-esteem or subjective well-being over time, and thus likely over-estimate the effects between self-esteem and subjective well-being. Fifthly, in fact, the loadings for the positive affect items were much smaller on the specific latent positive affect factor than they were on the general subjective well-being factor (see Supplemental Tables). It is not clear that whether positive affect items are still considered indicator of positive affect after removing all the shared variance explained by the general subjective well-being factors. Future researchers in methodology could attempt to answer this question and further validate the reliability of the bi-factor model of subjective well-being. Finally, the period between T1 and T2 (two months) was a relatively short time interval. Further studies would be necessary to use a longer time interval to explore the relationship between self-esteem and the bi-factor structure of subjective well-being.

### 4.4 Implications

Despite these limitations, the present study is the first attempt to explore the link between self-esteem and the different structures of subjective well-being from a longitudinal perspective. The present study provided an important advance in understanding the relationship between self-esteem and the tripartite structure of subjective well-being through demonstrating the results of adopting each of the various structural conceptualizations. Further, the side-by-side comparison of four structural models provided valuable information about the relative merits and shortcomings associated with each of the models examined. The results

of the vast majority of models support the existence of a bidirectional relationship between self-esteem and subjective well-being, but the specific results differed between models. For example, in the three-factor model, self-esteem predicted subsequent negative affect, but that result was absent in the causal model. Together, the results of this study highlight the consequences of adopting different conceptualizations of the subjective well-being. Simply speaking, conclusions about the basic characteristics of subjective well-being, including its stability, predictors, and predicted factors can vary considerably depending on the structural model employed. Therefore, future researchers should choose model cautiously when studying subjective well-being, and it is necessary to clarify why the model was chosen and what conceptual issues it may involve.

Meanwhile, the present study is also the first attempt to explore the link between self-esteem and subjective well-being from a longitudinal perspective using the bi-factor model. We found self-esteem was associated with an increase in later specific latent life satisfaction in emerging Chinese adults, supporting the bottom-up model of subjective well-being. Besides, there is a reciprocal link between self-esteem and the general factor of subjective well-being in emerging Chinese adults, which can be explained by the normative well-being model. Because of the advantages of the bi-factor model, explanations of the relationship between self-esteem and subjective well-being can be facilitated. Although the bi-factor model of subjective well-being has obvious advantages (Yang et al., 2020; Daniel-González et al., 2020), the relevant literature is still insufficient, especially regarding the validity of the bi-factor model of subjective well-being. Therefore, our study also invites further investigation to explore the link between the bi-factor structure of subjective well-being and other variables (e.g., Big Five personality, socioeconomic status and social support).

## Declarations

**Compliance with ethical standards** The study was conducted according to the Declaration of Helsinki and was approved by the Shaanxi Normal University committee.

**Conflict of interest** All authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Informed consent** All participants agreed to participate in the study and all authors agreed to publish this article.

**Other measures** This study is part of our recently completed project investigating well-being in adulthood. Participants were instructed to undertake a series of online questionnaires which mainly assess one's socioeconomic status, positive traits (i.e., emotional intelligence, self-esteem, psychological resilience), social support and well-being. These other measures have not yet been examined, so they were not included in the

present work. Also, no other publications have used the same dataset for other analyses and/or empirical reports until now.

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