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RESEARCH PAPER

Self-concept Clarity and Subjective Well-Being: Disentangling Within- and Between-Person Associations

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Abstract
Previous research has suggested that, among adolescents, clarity about one's self-concept is closely related to subjective well-being. However, longitudinal studies are scarce, and whether a clear self-concept is the cause or effect of subjective well-being remains unclear. This study examined the dynamic longitudinal associations between self-concept clarity and subjective well-being at the between- and within-person levels over a one-year time span among adolescents (baseline $M_{age} = 16.01$ years; 57.0% girls) from China. The data were collected in three waves (each at a six-month interval), in which adolescents reported their self-concept clarity and well-being (i.e., positive and negative affect and personal satisfaction with life). Both Random Intercept Cross-Lagged Panel Models (RI-CLPMs) and Cross-Lagged Panel Models (CLPMs) were applied to examine the stability, cross-sectional relationships, and cross-lagged effects between adolescents' self-concept clarity and subjective well-being over time. The CLPMs provided unique support for a reciprocal relations model of self-concept clarity and subjective well-being (including both cognitive and emotional well-being) across three time points, although the results of traditional CLPM might represent an unknown blend of between- and within-person effects. However, the RI-CLPM analyses provided tentative support only for cross-sectional correlations between self-concept clarity and well-being outcomes. Our findings advance the literature by elucidating longitudinal relationships between self-concept clarity and subjective well-being in collectivist cultural contexts using CLPM and RI-CLPM.

Keywords Self-concept clarity · Emotional well-being · Cognitive well-being · Longitudinal relationship · Cross-lagged panel model · Adolescent

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1 Introduction

Having a clear sense of self represents a challenging task because it implies finding consistency, continuity, and relative stability among many different components of the self, which are related to multiple life domains and roles, such as continuity and consistency in values, relationships, and even behavioral expressions (Crocetti et al., 2015). According to Erikson's identity theory, although self-development is a major task throughout life, it becomes particularly important in adolescence, which is characterized as a period of storm and stress (Erikson, 1968; Hall, 1904). Self-concept clarity (SCC), which is an essential aspect of the self, refers to the extent to which individuals have a clear, confident, coherent, and relatively stable sense of their identities (Campbell et al., 1996; Crocetti et al., 2015). As a critical indicator of one's mental health, SCC is a dynamic variable throughout one's life, especially in adolescence (Lodi-Smith et al., 2017; van Dijk et al., 2014). Furthermore, SCC may be positively associated with subjective well-being (SWB;), an index of happiness that includes both one's people's emotional response and whole life satisfaction (Diener, 1994; Kong et al., 2015). However, longitudinal studies are scarce, and whether clear self-concept is the cause or effect of SWB is still unclear. Identifying the direction of the longitudinal relationship between SCC and well-being among adolescents is significant in prevention and intervention practice. To address this research gap, the present study utilized a three-wave longitudinal design to examine the direction of the longitudinal link between SCC and SWB among adolescents of various ages.

1.1 SCC and SWB

People's beliefs about themselves play a central role in their psychological experiences and can be powerful determinants of their thoughts, feelings, and actions (Levey et al., 2019; Posavac & Posavac, 2020). This suggests a positive relationship between SCC and SWB in adolescents (Butzer & Kuiper, 2006; Na et al., 2018; Xiang et al., 2020a, 2020b, 2022a, 2022b), with higher levels of SCC (e.g., higher levels of self-consistency and self-confidence, more stability) associated with higher levels of life satisfaction and positive emotions and lower levels of anxiety and depressive symptoms. For instance, Parise et al. (2019), using a sample of 922 adolescents (aged 14–16 years), found that SCC was an effective predictor of emotional regulation when dealing with positive and negative emotions. However, other studies have reported a weak link between self-consistency and SWB (Du, 2020; Leung & Leung, 1992; Suh, 2002) and no significant link between SWB and self-presentation (Liu et al., 2016). For example, Suh (2002) proposed that in East Asian cultures, the self is seen as a product of society, and individuals have a more flexible view of themselves across social situations. Additionally, people in Eastern cultures (e.g., Korean culture) with a consistent identity are not more inclined to receive positive feedback from society, which might not contribute to their positive emotions. Thus, their SWB is less predictable by the level of self-consistency. However, most of the above findings are based on cross-sectional studies. Therefore, it is meaningful to explore the longitudinal relationship between SCC (considering self-consistency an important part of one's identity) and SWB in collectivist countries (e.g., China).

The emotional component of well-being (EWB) refers to the emotional quality and balance of one's daily experience, including positive and negative emotional states in an individual's life, which makes one happy or unhappy (Ebert et al., 2020; Seidlitz et al., 1997).

The cognitive component of well-being (CWB) is a judgment process through which individuals cognitively evaluate the extent to which they are satisfied with their life (Diener et al., 1985; Kapikiran, 2012). Previous research suggests that there are different relationships between SCC and well-being components. For instance, Massoni (2014) recruited 97 healthy participants for their experiments and found that emotional states were predictors of metacognition in decision-making. Additionally, in a sample of 118 people in the United States, Seo and Ilies (2009) found that positive emotion was beneficial for self-efficacy, which is closely correlated with SCC. However, Ritchie et al. (2011) found that SCC mediated the relationship between stress and CWB, while CWB did not affect SCC through stress. Most studies investigating the key outcomes or factors of SCC have used a cross-sectional design. Whether SCC is a cause or effect of SWB remains unclear.

1.2 The Bidirectional Relationships Between SCC and SWB

According to self-discrepancy theory, individuals feel good when their actual selves are consistent with their expected final states, and they become emotionally distressed when these two entities are discrepant (Barnett et al., 2017). SCC could facilitate self-regulation processes that involve a comparison between one's current self and ''ideal selves,'' that is, representations of the self that a person wishes to become or wants to avoid becoming (Ritchie et al., 2011). For example, SCC can mediate the relationship between family cohesion and SWB (including both EWB and CWB; Xiang et al., 2020a, 2020b). Liu et al. (2017) indicated that SCC was a mediator in the association between psychological *suzhi* (one's ability to adapt to and endure different external situations) and social anxiety. Additionally, Xiang et al., (2022a, 2022b) found that the initial level of SCC positively accounted for the initial levels of CWB and positive affect, and the slope factor of SCC was separately related to the CWB slope factor and positive affect slope factor of boys and girls, respectively. In a longitudinal study, van Dijk et al. (2014) found that SCC predicted lower anxiety and symptoms of depression in a sample of 323 adolescents at a four-year follow-up. Moreover, a study conducted across five years revealed that adolescents' SCC was a strong predictor of the quality of family relationships (Becht et al., 2017), which is an important factor when measuring a given family's degree of happiness.

Second, according to the affect infusion model, affect can influence our thinking and judgment in areas such as self-perception, self-judgment, and SCC (Forgas, 1995). Thus, it is likely that adolescents' SWB may account for SCC development, and in this sense, adolescents' CWB and EWB may affect their sense of self. For instance, evidence from existing research indicates that emotional states can be useful and adaptive tools in goal attainment and decision-making (Harlé et al., 2012; Orehek et al., 2011), which correlates highly with the metacognitive process of SCC (Fite et al., 2017;). Theories of mood-congruent processing regard positive affect as having a beneficial, multifaceted, and flexible role in self-regulatory processes (e.g., responding to diagnostic information about the self; Aspinwall, 1998; Isbell et al., 2013); in addition, negative affect has been treated as a mediator in the association between negative daily events and daily SCC (Nezlek & Plesko, 2001). Moreover, Sang et al. (2007) showed that life satisfaction was a positive predictor of college students' self-consistency, which is closely related to SCC. On the same note, some indirect evidence showed that life satisfaction is closely associated with the quality of attachments (Ma & Huebner, 2008; Waring et al., 2019) and attachment avoidance may predict lower SCC (Emery et al., 2018). Cole et al. (1999) studied 436 young adolescents longitudinally across four waves in two years and found that negative affect could predicted

changes in self-perceived competence (Cole et al., 1999), which strongly correlates with SCC.

1.3 Differences in Gender and Age

There are possible gender and age differences in the relationship between SCC and well-being. According to research by Sawyer et al. (2018), the new view of the age range of adolescence that it is between 10 and 24 years, which corresponds more closely to the adolescents' growth and people's general understanding of this life stage. Meanwhile, previous studies have shown that SCC is positively associated with well-being both in younger (e.g., $M_{age} = 13.3$) and older (e.g., $M_{age} = 19.01$) adolescent samples, with correlations ranging between 0.14 and 0.46 (Hanley & Garland, 2017; van Dijk et al., 2014; Xiang et al., 2022a, 2022b). In addition, recent and growing research indicates that SCC and SWB change with gender and age among adolescents (Crocetti et al., 2015; Csank & Conway, 2004; Xiang et al., 2021). For instance, Crocetti et al. (2015) studied 497 Dutch families over six years and found that adolescent boys show an increase in SCC during the early teenage years, followed by a decline after they turn 16. Csank and Conway (2004) conducted experimental manipulations of SCC and found that these manipulations were effective in 18-year-old participants but ineffective in 30-year-old participants, emphasizing the importance of age differences in SCC. Moreover, Schwartz et al. (2010) followed 580 adolescents for three weeks and found that in young adolescents ($M_{age} = 13.32$), confusion regarding identity processes served as a precursor to anxiety and depression, but not vice versa. Xiang et al. (2021), using a sample of 2792 adolescents, found that the level of SCC in boys and older adolescents was higher than that in girls and young adolescents; furthermore, older adolescents were more likely to experience higher levels of life satisfaction and positive emotions than younger adolescents. Similarly, Xiang et al., (2022a, 2022b) found a gender-specific relationship between SCC and SWB in a longitudinal study using latent growth models. Considering that gender and age differences may exist in the relationship between SCC and SWB, the present study further examined age and gender differences as an exploratory analysis.

1.4 The Present Study

According to the literature, clarity about oneself may make adolescents happy; happiness, in turn, may result in adolescents feeling more confident and consistent in their beliefs about themselves (Light, 2018). Although previous research (Xiang et al., 2022a, 2022b) examined the development of SCC in adolescents from ages 11–24 using the latent growth curve model, the present study has unique contributions. First, the present study addressed the research gaps related to causality to examine the bidirectional relationship between SCC and SWB, which was not examined in previous research (Xiang et al., 2022a, 2022b).

Second, compared to Xiang et al., (2022a, 2022b), this study further disentangled within- and between-person associations in the longitudinal relationship between SCC and SWB. More specifically, we conducted Random Intercept Cross-Lagged Panel Models (RI-CLPMs) to separate within- and between-person effects. RI-CLPMs contain the important features of Cross-Lagged Panel Models (CLPMs) but extend CLPMs by separating the within-person variance from between-person variance via random intercepts, thus more closely approximating causal relations (Hamaker et al., 2015; Yong et al., 2022). CLPMs were also conducted as an auxiliary analysis in the present study to provide insight into

the longitudinal associations between SCC and SWB (including both EWB and CWB) although CLPMs can blend within-and between-person effects. Second, we examined gender and age (e.g. younger and older adolescents) differences in both RI-CLPMs and CLPMs.

2 Method

2.1 Participants and Procedures

A total of 2001 adolescents (M_{age} = 16.01 years, SD = 2.68) participated in the present study and were selected using cluster sampling from three middle and high schools and five universities in the Hubei, Jiangxi, Hebei, Chongqing, and Sichuan provinces located in central, east, north, and southwest China. The study started with a sample where 65.5% consisted of junior and high school students (i.e., young adolescents), with ages ranging from 11 to 18 years (M_{age} = 14.41 years, SD = 1.74), and 34.5% of college students (i.e., older adolescents, most being freshmen), with ages ranging from 17 to 24 years (M_{age} = 19.04 years, SD = 1.01). Data were collected three times, approximately six months apart: (1) November 2019 (girls: n = 1140; boys: n = 860; undisclosed: n = 1); (2) June 2020 (girls: n = 1041; boys: n = 661; undisclosed: n = 1), and (3) November 2020 (girls: n = 924; boys: n = 683; undisclosed: n = 1). Across Time 1 (T1) to Time 3 (T3), 393 participants had missing data (19.6% of the total sample). The participants were the same as those in a previous longitudinal study (Xiang et al., 2022a, 2022b) that explored the development of SCC in adolescents aged 11–24 years. More information about the demographic characteristics of the sample from T1–T3 can be found in Table 1.

We used G*power (Version 3.1; Faul et al., 2009) to determine the sample size of our study. Social science research has always suggested a small effect size (e.g., r = 0.08 to

Table1 Participants' demographic characteristics

Characteristic	(*T1*: N = 2001)	(*T2*: N = 1703)	(*T3*: N = 1608)
Age stage			
Younger adolescents (M_{age} = 14.41 years)	1310 (65.5%)	1110 (65.2%)	1173 (72.9%)
Older adolescents (M_{age} = 19.04 years)	691 (34.5%)	593 (34.8%)	435 (27.1%)
Gender			
boys	860 (42.9%)	661 (38.8%)	683 (42.5%)
girls	1140 (57.0%)	1041 (61.1%)	924 (57.5%)
Missing data	1 (0.01%)	1 (0.01%)	1 (0.01%)
Only child status			
Yes	426 (21.3%)	358 (21.1%)	328 (20.4%)
No	1570 (78.5%)	1341 (78.7%)	1277 (79.4%)
Missing data	5 (0.2%)	4 (0.2%)	3 (0.2%)
Home location			
Urban	567 (28.3%)	487 (28.6%)	437 (27.2%)
Rural	1433 (71.6%)	1216 (71.4%)	1171 (72.8%)
Missing data	1 (0.01%)	0 (0.00%)	0 (0.00%)

0.10) for the relationship between SCC and SWB. We needed to include at least 1221 participants, which would provide 80% statistical power (close to 95%) to detect a small relationship (i.e., $r = 0.08$) between SCC and SWB.

The ethics committee of the university approved the study; and this study's procedures were conducted as per the Declaration of Helsinki. Before participating in the survey, adolescents and their parents received written information about the research and were asked to provide their oral consent. Within each period of the study, trained researchers administered the self-report questionnaire to the participants during a 45-min class period, at which time the researchers collected the completed questionnaires.

2.2 Measures and Materials

Demographic information. In the present study, we collected the following demographic characteristics: Age, gender, home location (e.g. rural or urban area), and only child status.

Self-concept clarity. The Self-Concept Clarity Scale (SCCS), which has often been used to measure the clarity and consistency of self-concept (Campbell et al., 1996), comprises 12 items, scored on a 7-point scale ranging from 1 (*complete disagreement*) to 7 (*complete agreement*). Items assess SCC using questions such as "My beliefs about myself often conflict with one another" and "I spend a lot of time wondering about what kind of person I really am." Except for items 6, "I seldom experience conflict between the different aspects of my personality," and 11, "In general, I have a clear sense of who and what I am," all items were scored in reverse. Mean scale scores were computed so that higher scores indicated higher SCC. Previous studies on the SCCS have shown good test–retest reliability, internal reliability, and high validity (Liu et al., 2017; Xiang et al., 2020a, 2020b). For scores in the present study, Cronbach's alpha coefficients for the SCCS were 0.81 (T1), 0.85 (T2), and 0.86 (T3). Additionally, confirmatory factor analysis (CFA) indicated that the model fits were acceptable: T1, $\chi^2/df = 9.78$, Comparative Fit Index (CFI) = 0.90, Tucker-Lewis Index (TLI) = 0.88, Root Mean Square Error of Approximation (RMSEA) = 0.07, 90%CI [0.061, 0.072], Standardized Root Mean Square Residual (SRMR) = 0.04; T2, $\chi^2/df = 6.90$, CFI = 0.94, TLI = 0.92, RMSEA = 0.06, 90%CI [0.053, 0.065], SRMR = 0.04; and T3, $\chi^2/df = 6.39$, CFI = 0.95, TLI = 0.94, RMSEA = 0.06, 90%CI [0.052, 0.064], SRMR = 0.03.

Subjective well-being. Evidence from previous research indicates that SWB contains two related but distinct components: CWB and EWB (Kong et al., 2015). The cognitive component of well-being was evaluated by the Satisfaction with Life Scale (SWLS; Diener et al., 1985), which consists of five items to measure overall satisfaction with one's life. Questions assess the extent to which people agree or disagree with each statement (e.g. ''I am satisfied with my life'') using a 7-point scale (1 = *totally disagree*, 7 = *totally agree*). Items were averaged with higher scores indicating higher life satisfaction. Existing research indicates that the Chinese version of the SWLS is a reliable and valid measurement to assess the CWB of Chinese adolescents (Kong et al., 2015; Teng et al., 2020a, 2020b). For scores in the present study, Cronbach's alpha coefficients for the SWLS were 0.72 (T1), 0.80 (T2), and 0.79 (T3). In addition, CFA indicated that model fits for SWLS were acceptable: T1, $\chi^2/df = 13.40$, CFI = 0.95, TLI = 0.90, RMSEA = 0.08, 90%CI [0.063, 0.096], SRMR = 0.03; T2, $\chi^2/df = 9.42$, CFI = 0.97, TLI = 0.94, RMSEA = 0.07, 90%CI [0.053, 0.089], SRMR = 0.03; and T3, $\chi^2/df = 14.76$, CFI = 0.96, TLI = 0.92, RMSEA = 0.09, 90%CI [0.075, 0.112], SRMR = 0.03.

The Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) was used to evaluate the emotional component of well-being. The PANAS contains 20 items describing

two different affect states (10 positive and 10 negative words, e.g., "active," and "afraid") using a 5-point Likert scale. The Positive Affect subscale (PAS) and Negative Affect subscale (NAS) scores were calculated separately, and the final EWB score was computed by subtracting the negative affect score from the positive affect score, with higher scores indicating higher levels of EWB (Kong et al., 2015). For scores in the present study, Cronbach's alpha coefficients for the NAS were 0.84 (T1), 0.88 (T2), and 0.86 (T3). Additionally, CFA indicated that model fits were acceptable: T1, χ^2/df = 17.22, CFI = 0.90, TLI = 0.84, RMSEA = 0.09, 90%CI [0.084, 0.096], SRMR = 0.05; T2, χ^2/df = 18.43, CFI = 0.90, TLI = 0.84, RMSEA = 0.10, 90%CI [0.094, 0.108], SRMR = 0.05; and T3, χ^2/df = 22.28, CFI = 0.84, TLI = 0.80, RMSEA = 0.11, 90%CI [0.108, 0.122], SRMR = 0.07. For the PAS, Cronbach's alpha coefficients were 0.83 (T1), 0.87 (T2), and 0.85 (T3). CFA indicated that model fits were acceptable: T1, χ^2/df = 13.10, CFI = 0.91, TLI = 0.90, RMSEA = 0.08, 90%CI [0.071, 0.084], SRMR = 0.04; T2, χ^2/df = 12.97, CFI = 0.91, TLI = 0.90, RMSEA = 0.08, 90%CI [0.077, 0.091], SRMR = 0.05; and T3, χ^2/df = 7.22, CFI = 0.94, TLI = 0.92, RMSEA = 0.06, 90%CI [0.055, 0.070], SRMR = 0.04.

2.3 Statistical Analysis

First, an indicator (0 = missing, 1 = complete) was created to examine whether the missing data were conditional on any of the key variables. Chi-squared tests (χ^2) for contingency and independent samples *t*-tests were used for gender, home location, only child status, age, SCC, CWB, and EWB. The results revealed that data on adolescents from urban and rural ($\chi^2_{[1]} = 5.73$, $p < 0.05$) and only children ($\chi^2_{[1]} = 3.94$, $p < 0.05$) were significantly insufficient or missing, as were those on SCC ($t = 2.79$, $p < 0.01$) and age ($t = 9.83$, $p < 0.001$), while other variables (gender, CWB, and EWB) were not significant in relation to missing data ($ps > 0.05$). Thus, missing at random and missing at complete random data may have appeared in the study variables, and consequently, we used the full-information maximum-likelihood method to deal with the missing data via Mplus 7.0.

Second, descriptive statistics and correlations were computed using SPSS 21.0. Then, the Intra-Class Correlation Coefficients (ICCs) coefficients for all the main variables (i.e., SCC, EWB, and CWB) were computed. The ICC coefficient indicates the proportion of between-person level variation in the total variation (Hoffman, 2015; Nie et al., 2019) in multilevel models. If there was substantial variance at the within-person level (i.e., at least 10%) for each measure, RI-CLPMs were conducted (Hamaker et al., 2015; Yang et al., 2022). In the present study, ICCs for SCC, CWB, and EWB were 0.56, 0.48, 0.56, respectively.

Third, CFA was calculated before conducting the RI-CLPM analyses to evaluate the longitudinal measurement invariance for all measures across three measurement occasions. $\Delta CFI \geq 0.01$ supplemented by $\Delta RMSEA \geq 0.015$ would be indicative of non-invariance (Chen, 2007; Cheung & Rensvold, 2002; Xiang et al., 2022a, 2022b).

Fourth, RI-CLPMs were employed to examine the direction of associations among the main variables (i.e., SCC, EWB, and CWB) of interest at the within-person level. Compared to CLPMs, RI-CLPMs can allow for disaggregation of the within- and between-person effects of the variables on the outcomes (Nie et al., 2019), through the inclusion of random intercepts (Hamaker et al., 2015; Yang et al., 2022). Covariates (i.e., age, home location, and only child status at Time 1), stability paths, cross-sectional correlations, and cross-lagged paths were incorporated in the models. We used the maximum likelihood robust estimator to process the non-normally distributed data.

Fig. 1 The standardized path coefficients for the random intercept cross-lagged panel models (A and B) and ▶ for the traditional cross-lagged panel models (C and D) of SCC and SWB. *Note*. All covariates are not presented in Fig. 1 and can be seen in Tables 5 and 6 SCC = self-concept clarity, EWB = emotional well-being, CWB = cognitive well-being, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Fifth, we conducted an auxiliary analysis by using standard CLPMs, in which within- and between-person variances were indistinguishable. Age (as a continuous variable being regressed), only child status, and home location were included as covariates in the CLPMs. These models were also constrained within correlations, cross-lagged effects, and autoregressive coefficients over time (see Fig. 1).

Sixth, a multi-group approach was applied to test gender and age (i.e., younger and older adolescents) invariances for the RI-CLPMs and CLPMs, respectively.

RI-CLPMs and CLPMs analyses were implemented in Mplus 7. All data were entered into the model as observed variables. Although the model's significance was calculated using the chi-squared statistic, we did not rely on it to assess model fit because it can easily reach significance due to larger effect sizes (Marsh et al., 2004; Teng et al., 2020a, 2020b). Consequently, other standard fit indices were employed, including the CFI, the TLI, RMSEA, and SRMR. The following criteria were used to indicate the goodness of fit: CFI and TLI ≥ 0.90, and RMSEA ≤ 0.10, and SRMR ≤ 0.10 (Hu & Bentler, 1999). Additionally, 95% confidence intervals (CIs) were applied for the unstandardized coefficients. A 0.05 significance level was used for all coefficients.

3 Results

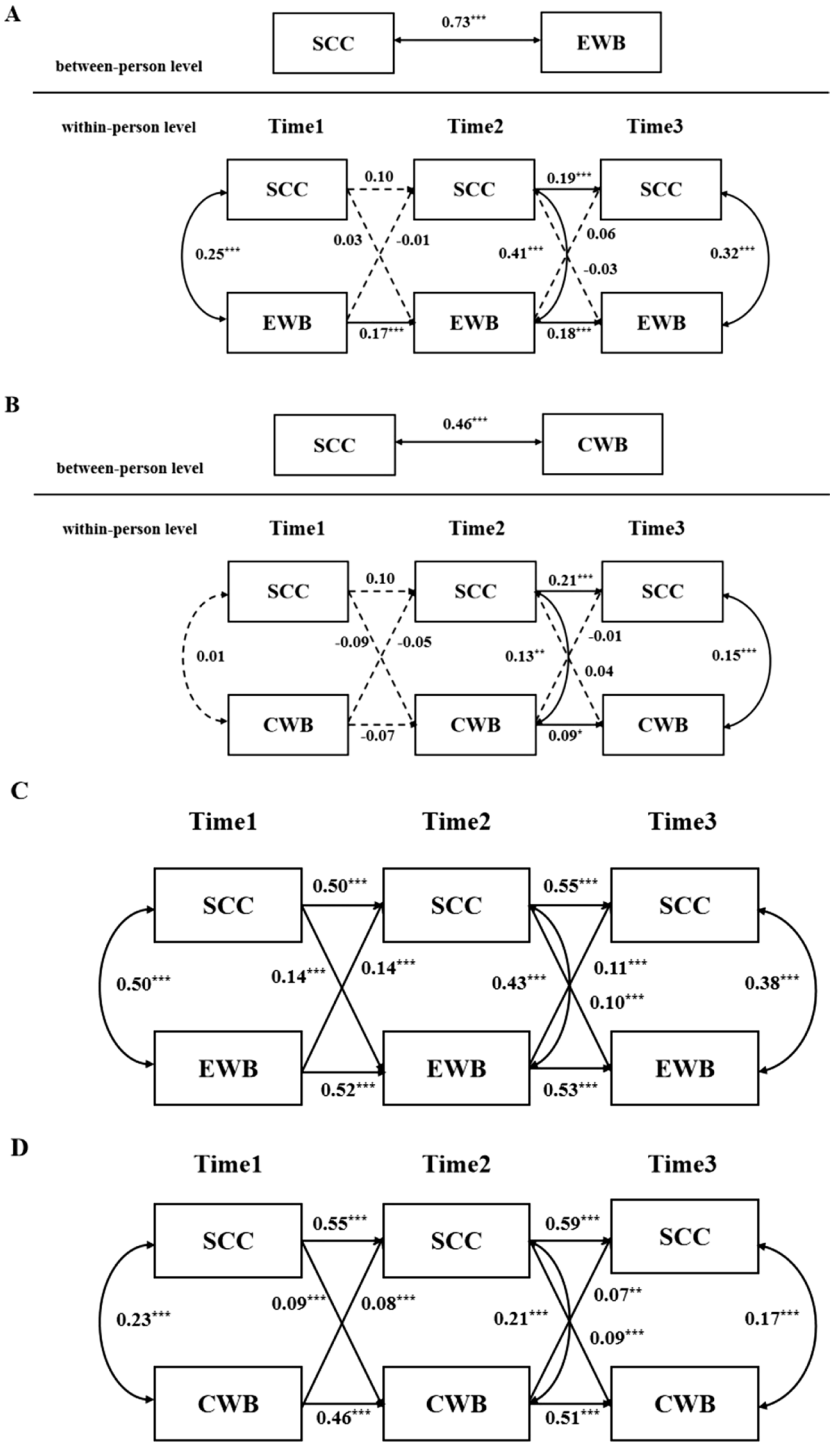
3.1 Preliminary Analyses

Tables 1 and 2 present the participant information and means, as well as the standard deviations for all indicator variables.

To explore the age (i.e., younger and older adolescents) differences in SCC, EWB, and CWB, we conducted a 3 (waves: T1, T2, and T3) × 2 (age: younger and older adolescents) ANOVA. Results showed that for SCC [$F(1, 1324) = 62.88$, $p < 0.001$, $\eta_p^2 = 0.01$] and EWB [$F(1, 1324) = 21.11$, $p < 0.001$, $\eta_p^2 = 0.02$], the main effect of age was significant; and the respective scores for SCC (T1: $M = 4.37$, $SD = 0.89$; T2: $M = 4.26$, $SD = 0.92$; T3: $M = 4.41$, $SD = 0.96$ vs. T1: $M = 3.96$, $SD = 0.96$; T2: $M = 3.87$, $SD = 0.98$; T3: $M = 4.01$, $SD = 1.02$) and EWB (T1: $M = 0.72$, $SD = 0.85$; T2: $M = 0.66$, $SD = 0.88$; T3: $M = 0.31$, $SD = 1.01$ vs. T1: $M = 0.58$, $SD = 0.97$; T2: $M = 0.31$, $SD = 1.01$; T3: $M = 0.46$, $SD = 0.97$) were higher for older adolescents than for younger adolescents. For CWB, the interaction effect of age and wave was significant [$F(2, 2644) = 20.55$, $p < 0.001$, $\eta_p^2 = 0.02$]. Simple effect analysis showed that for older adolescents, the scores for CWB at T2 were significantly higher than at T1 and T3 [$F(2, 2202) = 19.93$, $p < 0.05$]. More information about the gender difference can be found in Xiang et al., (2022a, 2022b).

3.2 Measurement Invariance

Before employing RI-CLPMs and CLPMs, we performed a longitudinal CFA to compare the long-term internal consistency of the measures in the three models. First, a configural


A
between-person level
SCC
0.73***
EWB
within-person level
Time1
Time2
Time3
SCC
SCC
SCC
0.10
0.19***
0.03
-0.01
0.06
0.25***
0.41***
-0.03
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B
between-person level
SCC
0.46***
CWB
within-person level
Time1
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SCC
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0.10
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-0.05
-0.01
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EWB
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0.52***
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D
Time1
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Time3
SCC
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SCC
0.55***
0.59***
0.23***
0.09***
0.08***
0.21***
0.07**
0.09***
0.17***
CWB
CWB
CWB
0.46***
0.51***

Table 2 Means and standard deviations of the model variables at T1, T2, and T3

	SCC		EWB		CWB	
	M	*SD*	*M*	*SD*	*M*	*SD*
T1						
Younger adolescents (N = 1310)	3.93	0.96	0.55	0.96	3.96	1.06
Older adolescents (N = 691)	4.44	0.93	0.80	0.92	3.86	1.03
Total (N = 2001)	4.11	0.98	0.64	0.95	3.92	1.05
T2						
Younger adolescents (N = 1110)	3.87	0.98	0.29	1.01	3.93	1.01
Older adolescents (N = 593)	4.34	0.98	0.73	0.94	4.15	0.99
Total (N = 1703)	4.03	1.00	0.44	1.01	4.00	1.01
T3						
Younger adolescents (N = 1173)	3.98	1.01	0.44	0.96	3.87	1.10
Older adolescents (N = 435)	4.45	0.97	0.71	0.94	3.79	1.06
Total (N = 1608)	4.11	1.02	0.51	0.96	3.84	1.09

SCC = self-concept clarity, EWB = emotional well-being, CWB = cognitive well-being, T1 = Time 1, T2 = Time 2, T3 = Time 3

invariance model (CIM) was used to estimate all parameters across the three waves; then, we performed a basic test of factorial invariance using a weak invariance model (WIM; Sayer & Cumsille, 2001) and constrained factor loadings to be equal across T1, T2, and T3. Finally, we established a strong invariance model (SIM) to make the factor loadings and intercepts equal across the time points. Model differences were evaluated by identifying the changes in CFI and RMSEA (i.e., $\Delta CFI \geq 0.01$ supplemented by $\Delta RMSEA \geq 0.015$ would be indicative of non-invariance; Chen, 2007, Cheung & Rensvold, 2002). In the present study, the difference between CIM and WIM and WIM and SIM for the models was as follows: SCCS ($\Delta CFI = 0.003$, $\Delta CFI = 0.006$; $\Delta RMSEA = 0.001$, $\Delta RMSEA = 0.001$), PAS ($\Delta CFI = 0.002$, $\Delta CFI = 0.014$; $\Delta RMSEA = 0.001$, $\Delta RMSEA = 0.002$), NAS ($\Delta CFI = 0.005$, $\Delta CFI = 0.023$; $\Delta RMSEA = 0.001$, $\Delta RMSEA = 0.003$), and SWLS ($\Delta CFI = 0.001$, $\Delta CFI = 0.012$; $\Delta RMSEA = 0.002$, $\Delta RMSEA = 0.005$; see Table 4). The results revealed that SCC had a strong equivalence, while EWB and CWB had a weak equivalence. The above results showed the invariance of our measurements over time. Additionally, correlation analyses reported that SCC, EWB, and CWB scores were moderately stable over time (see Table 3). Moreover, baseline age, child status, and home location were found to be associated with SCC, EWB, and CWB across the three waves ($r = -0.16$–0.18, $ps < 0.05$). Thus, these variables were added as covariates in the final cross-lagged panel model.

3.3 Random INTERCEPT Cross-Lagged Panel Model

The RI-CLPMs included the covariates (e.g. age, home location and only child status) at T1, cross-sectional correlations between SCC and SWB across the three assessment waves throughout the year (e.g. SCC with EWB and CWB at T1, T2, and T3), stability paths of SCC and SWB (e.g., path of SCC from T1 to T2), and bidirectional effects of SCC and SWB. The model fit indexes for RI-CLPMs indicated acceptable model fit both for EWB and CWB: $\chi^2(7) = 106.29$, CFI = 0.98, TLI = 0.90, RMSEA = 0.084, 95% CI = [0.071, 0.099], and SRMR = 0.04 and $\chi^2(7) = 197.42$, CFI = 0.94, RMSEA = 0.117, 95%

Table 3 Correlations between model variables for the total sample

	1	2	3	4	5	6	7	8	9
1 SCC T1	1								
2 SCC T2	0.57 (0.51 0.59)	1							
3 SCC T3	0.51 (0.45 0.55)	0.60 (0.56 0.64)	1						
4 EWB T1	0.51 (0.46 0.55)	0.39 (0.33 0.43)	0.38 (0.32 0.42)	1					
5 EWB T2	0.41 (0.46 0.55)	0.57 (0.53 0.61)	0.43 (0.38 0.47)	0.58 (0.53 0.62)	1				
6 EWB T3	0.38 (0.33 0.43)	0.40 (0.35 0.45)	0.53 (0.51 0.59)	0.53 (0.48 0.57)	0.57 (0.54 0.61)	1			
7 CWB T1	0.23 (0.18 0.29)	0.20 (0.13 0.24)	0.21 (0.16 0.27)	0.33 (0.33 0.44)	0.33 (0.27 0.38)	0.30 (0.26 0.36)	1		
8 CWB T2	0.21 (0.14 0.25)	0.31 (0.26 0.37)	0.26 (0.20 0.31)	0.50 (0.21 0.32)	0.50 (0.45 0.54)	0.37 (0.31 0.41)	0.47 (0.41 0.51)	1	
9 CWB T3	0.19 (0.13 0.25)	0.24 (0.18 0.29)	0.28 (0.24 0.34)	0.36 (0.26 0.37)	0.36 (0.31 0.41)	0.45 (0.41 0.51)	0.47 (0.43 0.53)	0.54 (0.49 0.59)	1

SCC = self-concept clarity, EWB = emotional well-being, CWB = cognitive well-being, T1 = Time 1, T2 = Time 2, T3 = Time 3. All correlation coefficients were significant at $p < 0.01$ level

CI = [0.103, 0.131], and SRMR = 0.05. As shown in Tables 5, 6, and Fig. 1, the correlations between the random intercepts of the RI-CLPMs showed significant between-person associations between SCC and EWB and between SCC and CWB. However, there were no significant bidirectional within-person relations between SCC and SWB (including both EWB and CWB) from T1 to T3 (β = -0.09 ~ 0.06, ps > 0.05). The cross-sectional correlations between SCC and SWB across three times were significant at the within-person level.

3.4 Auxiliary Analyses: Cross-Lagged Panel Models

In addition to the main RI-CLPMs, standard CLPMs were constructed as an auxiliary analysis. The CLPMs indicated acceptable fits both for EWB and CWB models: $\chi^2(10) = 269.63$, CFI = 0.91, RMSEA = 0.112, 95% CI = [0.103, 0.126], and SRMR = 0.05 and $\chi^2(10) = 262.22$, CFI = 0.84, RMSEA = 0.133, 95% CI = [0.121, 0.145], and SRMR = 0.06. The findings showed that when using standard CLPMs, in which between- and within-person variances are blended, reciprocal cross-lagged paths were found between SCC and EWB (β = 0.10 ~ 0.14, ps < 0.001) and between SCC and CWB (β = 0.07–0.09, ps < 0.01; see Table 5, Table 6, and Fig. 1).

3.5 Gender and Age Differences

The results of gender (1 = boy, 2 = girl) and age (1 = younger adolescents, 2 = older adolescents) invariance analyses demonstrated that for the EWB model, two associations were significantly different across gender and age: (1) the cross-lagged effect of SCC at T2 to EWB at T3 (Wald $\chi^2 = 4.21$, $p = 0.041$, $\beta_{\text{younger adolescents}} = 0.07$, $p < 0.05$ *vs.* $\beta_{\text{older adolescents}} = 0.20$, $p < 0.001$) and (2) the cross-sectional correlations between SCC at T2 and EWB at T2 (Wald $\chi^2 = 4.01$, $p = 0.045$, $r_{\text{boy}} = 0.48$, $p < 0.001$ *vs.* $r_{\text{girl}} = 0.39$, $p < 0.01$). For the CWB model, significant gender (Wald $\chi^2 = 4.07$, $p = 0.044$, $r_{\text{boy}} = 0.28$, $p < 0.001$ *vs.* $r_{\text{girl}} = 0.16$, $p < 0.01$) and age (Wald $\chi^2 = 7.33$, $p = 0.007$, $r_{\text{younger adolescents}} = 0.26$, $p < 0.001$ *vs.* $r_{\text{older adolescents}} = 0.09$, $p = 0.082$) differences were found in the cross-sectional correlations between SCC at T2 and CWB at T2.

4 Discussion

This is the first study to utilize both traditional and more contemporary analytical approaches (CLPMs and RI-CLPMs) to examine the associations between SCC and SWB concurrently and over time among a sample of Chinese adolescents. We hypothesized that there are reciprocal relationships exist between SCC and SWB. The CLPMs provided unique support for the reciprocal relations model of SCC and SWB (containing both CWB and EWB) across three time points, although these models might blend within-and between-person effects to an unknown degree. However, when using the RI-CLPMs, the bi-directional relationship evidenced in CLPMs disappeared, and only positive cross-sectional correlations between SCC and well-being outcomes became significant, with a better model fit than the CLMPs.

As expected, the RI-CLPMs and CLPMs indicated that there were positive cross-sectional relationships between SCC and SWB. Based on the self-consistency and self-discrepancy theory (Fournier et al., 2015; Higgins, 1987), having greater clarity about one's self-concept is closely related to SWB compared to having less clarity about one's

self-concept (Martin et al., 2019; Xiang et al., 2020a, 2020b). The finding that higher levels of SCC are linked to higher levels of EWB and CWB matches the theoretical rationale that having a clear and consistent self is a potentially critical factor in the development of EWB and CWB and enhances SWB understanding by forming associations between SCC and SWB (Barnett et al., 2017; Becht et al., 2017). The finding also fits the idea that individuals who feel clear and confident in their self-definition have a more positive view of themselves (e.g. higher levels of self-esteem) and experience greater happiness levels and less anxiety (Campbell et al., 1996; van Dijk et al., 2014; Xiang et al., 2020a, 2020b). Additionally, previous research on self-concept dynamics in adolescents found that SCC is linked to anxiety and depression (Schwartz et al., 2012; van Dijk et al., 2014), partly consistent with the hypothesis that higher levels of SCC correlate to higher levels of well-being. Our research expands upon the previous research at the within-person level, demonstrating that having high levels of SCC may correlate to high levels of EWB and CWB.

However, after the between-person stability was separated out, the cross-lagged effects in the RI-CLPMs demonstrated that the within-person fluctuations in SCC did not exert a positive effect on the subsequent levels of SWB (including both EWB and CWB). Meanwhile, there was no reciprocal relationship between SCC and SWB when cross-lagged paths pertain only to causal within-person differences, which is different from the results of the CLPMs auxiliary analysis. Compared to CLPMs, the main advantage of RI-CLPMs is that they account for stable trait-like components (between-person effect) that control for stable individual differences, allowing us to infer within-person relationships between SCC and SWB (Usami, 2021). Therefore, previous studies examining the reciprocal relationship between SCC and depression and anxiety (van Dijk et al., 2014) using traditional CLPMs might overestimate cross-lagged paths, which were confounded by trait-like between-person differences. Additionally, the causal result of our RI-CLPMs was likely related to a weak link between self-consistency (one of the important features of SCC) and SWB in a collectivist culture, which has been demonstrated by Suh (2002) and Du (2020).

As for the individual differences, there were gender and age differences in the longitudinal associations between SCC and SWB when within-and between-person effects were blended. Specifically, we found that the cross-sectional associations between SCC and SWB (including both CWB and EWB) at T2 were stronger for boys than for girls. This was consistent with previous studies indicating that adolescent boys report higher levels of SCC and SWB (Crocetti et al., 2015; Xiang et al., 2022a, 2022b). There were no clear reasons why boys should benefit more than girls in the cross-sectional relationship between SCC and SWB, but this result was partly consistent with the research of Bohanek and Fivush (2010), demonstrating that adolescent boys displayed higher levels of happiness than girls when immersing themselves in their stories (e.g., a representation of metacognition). Meanwhile, prior research indicates that in the development and construction of a self-concept, adolescents' increased frequency in thinking about themselves might aggravate internal problems, such as depression and anxiety. However, compared to adolescent girls, adolescent boys are less likely to experience negative emotions (e.g., depression, anxiety, and stress) or be disturbed by negative daily events and their frequency, and the boys' slope factor of SCC was positively associated with the slope factor of life satisfaction (Xiang et al., 2021, 2022a, 2022b). Moreover, Moksnes and Espnes (2012) demonstrated that the association of self-esteem, which is highly associated with SCC, and depression was stronger for girls than for boys, which could provide indirect evidence for the moderating role of gender in the association of SCC and SWB. In addition, we found that the prediction of SCC at T2 on EWB at T3 was stronger for older than for younger adolescents. However, the cross-sectional correlation between SCC and CWB at T2 was stronger for

younger adolescents than for older adolescents. A potential explanation for this age difference could be that when transitioning to college life, first-year students (i.e., older adolescents) experience changes in interpersonal relationships and occupational stress (Teng et al., 2020a, 2020b; Xiang et al., 2020a, 2020b), which are likely to influence their sense of self-identity and consequently influence their daily emotions. Thus, the SCC of freshmen is more likely to be associated with situational factors (e.g., EWB) than continuously stable factors (e.g., CWB). Meanwhile, compared to freshmen, younger adolescents have more defined life goals (e.g., completion of academic examinations), and their living environment changes less, which might be more associated with high levels of life satisfaction, which was a more consistent and stable factor. However, RI-CLPMs did not show gender and age differences in the relationship between SCC and SWB.

The above findings have several implications for practice with respect to improving SWB. First, the cultivation of SCC in adolescents may improve their SWB. According to self-verification theory, self-verification from close others is essential for maintaining a clear sense of self (Emery et al., 2018; Joiner, 1995). People preferentially solicit, attend to, and believe in self-verifying feedback, and are more satisfied with self-verifying relationships (Joiner, 1995). Meanwhile, affectively, positive feedback is pleasant for individuals with both positive and negative self-concept (Joiner, 1995). Thus, parents, peers, and educators could provide positive feedback to increase self-consistency and self-confidence among adolescent students, which might contribute to adolescents' SWB. Second, this longitudinal study found that the level of SCC and well-being outcomes were higher for older adolescents than for younger adolescents. These results fit with previous research indicating that personal identity in early adolescence is characterized by confusion and uncertainty (Schwartz et al., 2012). Meanwhile, higher SWB was observed in older than in early adolescents (Xiang et al., 2021). Due to the development of cognitive ability and abstract logical thinking, older adolescents form more mature and interrelated self-descriptions, thus improving the internal consistency and relative stability of self-cognition, which may contribute to the development of SWB. Thus, paying more attention to the development of cognitive and logical thinking abilities of early adolescents could play an important role in improving their SCC and well-being. Third, by using CLPMs, we found that the associations between SCC and SWB were stronger for boys than for girls. Based on previous research, adolescent girls have a greater tendency toward internalizing problems (e.g., anxiety and mood disorders; Ybrand, 2008), and they are inclined to rely on social support to overcome mood disorders (Thayer et al., 1994; Xiang et al., 2022a, 2022b). Solid and positive social support networks might provide them with a clearer sense of self, which leads to increased happiness. Thus, parents and educators should be concerned about the interpersonal environment of girls, strive to build a positive social support network, and pay attention to the cultivation of independent personalities and reduce the negative influence of bad interpersonal relationships on their mental health (e.g., SWB). Since this result was not replicated in RI-CLPMs, future studies are needed to further explore this issue.

4.1 Strengths and Limitations

The present study contributes significantly to future research in numerous ways. First, this study used multi-wave longitudinal designs with a large sample, which helps to improve the ecological validity of our research results. Additionally, our RI-CLPM and CLPM design contribute to examining the longitudinal associations between SCC and SWB at the within-person level and when within- and between-person effects are

blended in adolescents with a wide age range in China, which has not been reported in previous studies. Moreover, the present study provides evidence concerning SCC potentially benefiting adolescents' mental health in collectivist societies, in which research considering of SCC is in its infancy (Gardner & Garr-Schultz, 2017). It is necessary to elaborate on the importance of studying associations between SCC and well-being in the context of Chinese culture. First, according to trait theory, individuals from all cultures demonstrate some degree of consistency in behavior and self-concepts (Du, 2020). The basic assumption of trait theory is that traits acting as important components of self-concepts are prevalent in people around the world. In order to distinguish people from each other, traits must have some degree of cross-cultural generality (Du, 2020; Matthews, 2018). Thus, our study provides longitudinal empirical evidence for this cross-cultural generality, which is of great significance for cross-cultural research on the relationship between SCC and SWB. Second, according to the social identity and self-categorization theories (Taylor, 1997), collective identity integration is thought to produce a more coherent sense of self, and individuals without a clear collective identity might have difficulty developing a clear personal identity, a deficit that translates to poor psychological well-being (Amiot et al., 2007; Usborne & Taylor, 2010). Usborne and Taylor (2010) found that SCC was a mediator in the relationship between cultural identity clarity and well-being, indicating that collective identity clarity might be associated with well-being through its clarification of personal identity. China, as a country with a collectivist culture, places great emphasis on collective identity. Thus, it is meaningful to explore the relationships between SCC and SWB in the context of Chinese culture.

Despite this study's contributions, limitations to our research can also be identified. First, the data were gathered with self-reported questions; the validity of our findings would increase if we combined data from multiple other sources (e.g., parents, teachers, and experts). Second the COVID-19 pandemic, which has widely and rapidly spread around the world since December 2019, interfered with the way people live, think, and feel. However, in China, at midnight on April 8, 2020, Wuhan lifted its outbound traffic control measures, meaning that the country had achieved a phased victory in epidemic control. On April 15, 2020, Wuhan Huoshenshan Hospital and Leishenshan Hospital officially closed their doors, followed by the resumption of classes and in-person work across China. Since then, people in China have gradually begun to return to normal life (e.g., returning to work and school). Thus, the data collection at T2 and T3 were conducted during a relatively normal life stage. Although the time interval used in this study tried to avoid the interference from the COVID-19 pandemic on the relationship between SCC and SWB, we ignored the mental health status of Chinese adolescents during the severe stage of the pandemic (December 2019 to March 2020), which may have had a potential impact on the relationship between SCC and SWB, especially at the within-person level. Future research should consider the COVID-19 pandemic as a covariate or compare the longitudinal relationship between SCC and CWB both in the COVID-19 period and in the normal life situation to improve the ecological validity of the longitudinal relationship between SCC and SWB. Finally, other self-related variables such as self-esteem, self-efficacy, and hope might influence the relationship between SCC and SWB. Future research should control these potentially influential variables to isolate the unique effect of SCC on SWB.

5 Conclusion

Despite much being known about the cross-sectional correlation between SCC and SWB (including both CWB and EWB) among adolescents, very little has been researched concerning their longitudinal relationships in collectivist cultural contexts. The present study used RI-CLPMs to examine the long-term associations between SCC and SWB among adolescents both at between- and within-person levels. This multilevel longitudinal research contributes to existing literature and is based on the study of adolescents of various ages, which has not been previously researched.

Appendix

See Tables 4, 5, 6.

Table 4 Model fit indices of measurement invariance

	Model fit indices						Model comparison test			
	χ^2	*df*	CFI	TLI	RMSEA	SRMR		$\Delta\chi^2$	ΔCFI	ΔRMSEA
SCCS										
CIM	2154.11	555	0.918	0.907	0.038	0.040				
WIM	2236.12	577	0.915	0.907	0.038	0.043	2 VS.1	81.32***	0.003	0.001
SIM	2296.04	589	0.912	0.906	0.038	0.045	3 VS.2	62.74***	0.006	0.001
PAS										
CIM	1577.72	372	0.928	0.916	0.040	0.036				
WIM	1620.37	390	0.926	0.918	0.040	0.038	2 VS.1	39.51**	0.002	0.001
SIM	1836.57	400	0.914	0.907	0.042	0.044	3 VS.2	249.83***	0.014	0.002
NAS										
CIM	2544.37	372	0.876	0.855	0.054	0.049				
WIM	2624.27	390	0.872	0.858	0.054	0.052	2 VS.1	76.75***	0.005	0.001
SIM	2972.44	400	0.853	0.840	0.057	0.062	3 VS.2	400.94***	0.023	0.003
SWLS										
CIM	275.13	72	0.969	0.955	0.038	0.029				
WIM	292.25	80	0.968	0.958	0.036	0.031	2 VS.1	15.63*	0.001	0.002
SIM	368.68	85	0.957	0.947	0.041	0.035	3 VS.2	89.16***	0.012	0.005

SCCS = self-concept clarity scale; PAS = positive affective scale; NAS = negative affective scale; SWLS = satisfaction with life scale; CIM = configural invariance model; WIM = weak invariance model; SIM = strong invariance model

Table 5 Standardized cross-lagged path coefficients of SCC and EWB in adolescents

Coefficient paths	RI_CLPM		CLPM	
	β	SE	β	SE
Covariates				
Age → SCC_T2	0.15***	0.03	0.04***	0.01
Home location → SCC_T2	− 0.08**	0.03	− 0.12**	0.05
Only child or not → SCC_T2	− 0.04	0.03	− 0.07	0.05
Age → EWB_T2	0.12***	0.03	0.03***	0.01
Home location → EWB_T2	− 0.04	0.03	− 0.06	0.05
Only child or not → EWB_T2	− 0.01	0.02	− 0.02	0.05
Age → SCC_T3	0.09**	0.03	0.02*	0.01
Home location → SCC_T3	− 0.06*	0.03	− 0.04	0.05
Only child or not → SCC_T3	− 0.05	0.03	− 0.08	0.06
Age → EWB_T3	0.04	0.03	− 0.01	0.01
Home location → EWB_T3	− 0.03	0.03	− 0.01	0.05
Only child or not → EWB_T3	− 0.05	0.03	− 0.11	0.05
Stability paths				
SCC_T1 → SCC_T2	0.10	0.06	0.50***	0.02
SCC_T2 → SCC_T3	0.19***	0.05	0.55***	0.03
EWB_T1 → EWB_T2	0.17***	0.05	0.52***	0.02
EWB_T2 → EWB_T3	0.18***	0.06	0.53***	0.03
Cross-sectional correlations				
SCC_T1 with EWB_T1	0.25***	0.04	0.50***	0.02
SCC_T2 with EWB_T2	0.41***	0.04	0.43***	0.03
SCC_T3 with EWB_T3	0.32***	0.03	0.38***	0.03
Cross-lagged effects				
SCC_T1 → EWB_T2	0.03	0.05	0.14***	0.02
SCC_T2 → EWB_T3	− 0.03	0.05	0.10***	0.03
EWB_T1 → SCC_T2	− 0.01	0.05	0.14***	0.02
EWB_T2 → SCC_T3	0.06	0.05	0.11***	0.03

SCC = self-concept clarity, EWB = emotional well-being, T1 = Time 1, T2 = Time 2, T3 = Time 3, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6 Standardized cross-lagged path coefficients of SCC and CWB in adolescents

Coefficient paths	RI_CLPM		CLPM	
	β	SE	β	SE
Covariates				
Age → SCC_T2	0.15***	0.03	0.11***	0.02
Home location → SCC_T2	−0.08**	0.03	−0.06**	0.02
Only child or not → SCC_T2	−0.04	0.03	−0.03	0.02
Age → CWB_T2	0.09**	0.03	0.06	0.02
Home location → CWB_T2	−0.03	0.03	−0.02	0.02
Only child or not → CWB_T2	−0.07*	0.03	−0.05	0.02
Age → SCC_T3	0.11***	0.03	0.05*	0.02
Home location → SCC_T3	−0.06*	0.03	−0.02	0.02
Only child or not → SCC_T3	−0.05	0.03	−0.03	0.02
Age → CWB_T3	−0.07**	0.03	−0.12***	0.02
Home location → CWB_T3	−0.06*	0.03	−0.05*	0.02
Only child or not → CWB_T3	−0.06*	0.03	−0.04	0.02
Stability paths				
SCC_T1 → SCC_T2	0.10	0.06	0.55***	0.02
SCC_T2 → SCC_T3	0.21***	0.05	0.59***	0.03
CWB_T1 → CWB_T2	−0.07	0.06	0.46***	0.02
CWB_T2 → CWB_T3	0.09*	0.05	0.51***	0.03
Cross-sectional correlations				
SCC_T1 with CWB_T1	0.01	0.04	0.23***	0.02
SCC_T2 with CWB_T2	0.13**	0.06	0.21***	0.03
SCC_T3 with CWB_T3	0.15***	0.03	0.17***	0.03
Cross-lagged effects				
SCC_T1 → CWB_T2	−0.09	0.06	0.09***	0.02
SCC_T2 → CWB_T3	0.04	0.05	0.09***	0.03
CWB_T1 → SCC_T2	−0.05	0.05	0.08***	0.02
CWB_T2 → SCC_T3	−0.01	0.04	0.07**	0.02

SCC = self-concept clarity, CWB = cognitive well-being, T1 = Time 1, T2 = Time 2, T3 = Time 3, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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Authors contribution GX: Conceptualization, Formal analysis, Writing-original draft, Writing-review & editing. ZT: Conceptualization, Formal analysis. QL: Writing-review & editing. HC: Writing-review & editing, Project administration.

Declarations

Conflict of interest All co-authors have approved the manuscript, and there are no conflicts of interest to declare.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent This manuscript has not been published or presented elsewhere in part or in entirety and is not under consideration by another journal. We have read and understand your journal's polices, and we believe that neither the manuscript nor the study violates any of these. All study participants provided informed consent, and the study design was approved by the appropriate ethics review board.

References

Amiot, C. E., de la Sablonniere, R., Terry, D. J., & Smith, J. R. (2007). Development and integration of social identities in the self: Toward a cognitive-developmental model. *Personality and Social Psychology Review, 11*, 364–388.

Aspinwall, L. G. (1998). Rethinking the role of positive affect in self-regulation. *Motivation and Emotion, 22*(1), 1–32.

Barnett, M. D., Moore, J. M., & Harp, A. R. (2017). Who we are and how we feel: Self-discrepancy theory and specific affective states. *Personality and Individual Differences, 111*, 232–237.

Becht, A. I., Nelemans, S. A., van Dijk, M. P. A., Branje, S. J. T., & van LierDenissenMeeus, P. A. C. J. J. A. W. H. J. (2017). Clear self, better relationships: Adolescents' self-concept clarity and relationship quality with parents and peers across 5 years. *Child Development, 88*(6), 1823–1833.

Bohanek, J. G., & Fivush, R. (2010). Personal narratives, well-being, and gender in adolescence. *Cognitive Development, 25*(4), 368–379.

Butzer, B., & Kuiper, N. A. (2006). Relationships between the frequency of social comparisons and self-concept clarity, intolerance of uncertainty, anxiety, and depression. *Personality and Individual Differences, 41*(1), 167–176.

Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavallee, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology, 70*(1), 141–156.

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling, 14*(3), 464–504.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*(2), 233–255.

Cole, D. A., Peeke, L., Dolezal, S., Murray, N., & Canzoniero, A. (1999). A longitudinal study of negative affect and self-perceived competence in young adolescents. *Journal of Personality and Social Psychology, 77*(4), 851–862.

Crocetti, E., Rubini, M., Branje, S., Koot, H. M., & Meeus, W. (2015). Self-concept clarity in adolescents and parents: A six-wave longitudinal and multi-informant study on development and intergenerational transmission. *Journal of Personality, 84*(5), 580–593.

Csank, P. A. R., & Conway, M. (2004). Engaging in self-review changes self-concept clarity: On differences between women and men, and low-and high-clarity individuals. *Sex Roles, 50*(7), 469–480.

Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology, 62*(1), 583–619.

Diener, E. (1994). Assessing subjective well-being: Progress and opportunities. *Social Indicators Research*, 421–475. https://doi.org/10.1007/1-4020-3742-2_16

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75.

Du, J. (2020). The relationship between self-concept consistency and well-being: The moderating effect of culture. *Advances in Psychological Science, 28*(10), 1751–1761.

Ebert, A. R., Bernstein, L. E., Carney, A. K., & Patrick, J. H. (2020). Emotional well-being during the first four months of Covid-19 in the United States. *Journal of Adult Development, 27*, 1–8. https://doi.org/10.1007/s10804-020-09365-x

Elliott, G. C. (1988). Gender differences in self-consistency: Evidence from an investigation of self-concept structure. *Journal of Youth and Adolescence, 17*(1), 41–57.

Emery, L. F., Gardner, W. L., Carswell, K. L., & Finkel, E. J. (2018). You can't see the real me: Attachment avoidance, self-verification, and self-concept clarity. *Personality and Social Psychology Bulletin, 44*(8), 1133–1146.

Erikson, E. H. (1968). *Identity: Youth and crisis*. Norton.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149–1160.

Fite, R. E., Lindeman, M. I. H., Rogers, A. P., Voyles, E., & Durik, A. M. (2017). Knowing oneself and long-term goal pursuit: Relations among self-concept clarity, conscientiousness, and grit. *Personality and Individual Differences, 108*, 191–194. https://doi.org/10.1016/j.paid.2016.12.008

Forgas, J. P. (1995). Mood and judgment: The affect infusion model (AIM). *Psychological Bulletin, 117*(1), 39–66.

Fournier, M. A., Di Domenico, S. I., Weststrate, N. M., Quitasol, M. N., & Dong, M. X. (2015). Toward a unified science of personality coherence. *Canadian Psychology-Psychologie Canadienne, 56*(2), 253–262.

Fullwood, C., James, B. M., & Chen-Wilson, C.-H. (2016). Self-concept clarity and online self-presentation in adolescents. *Cyberpsychology, Behavior, and Social Networking, 19*(12), 716–720.

Gardner, W. L., & Garr-Schultz, A. (2017). Understanding our groups, understanding ourselves: The importance of collective identity clarity and collective coherence to the self. *In Self-concept clarity* (pp. 125–143). Springer, Cham.

Hall, G. S. (1904). *Adolescence: Its psychology and its relation to physiology, anthropology, sociology, sex, crime, religion, and education*. Prentice Hall.

Hamaker, E. L., Kuiper, R. M., & Grasman, R. P. P. P. (2015). A critique of the cross-lagged panel model. *Psychological Methods, 20*(1), 102–116. https://doi.org/10.1037/a0038889

Hanley, A. W., & Garland, E. L. (2017). Clarity of mind: Structural equation modeling of associations between dispositional mindfulness, self-concept clarity and psychological well-being. *Personality and Individual Differences, 106*, 334–339. https://doi.org/10.1016/j.paid.2016.10.028

Harlé, K. M., Chang, L. J., & Wout van'tSanfey, M. A. G. (2012). The neural mechanisms of affect infusion in social economic decision-making: A mediating role of the anterior insula. *NeuroImage, 61*(1), 32–40.

Higgins, E. T. (1987). Self-discrepancy: A theory relating self and affect. *Psychological Review, 94*(3), 319–340.

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change*. Routledge.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55.

Isbell, L. M., McCabe, J., Burns, K. C., & Lair, E. C. (2013). Who am I?: The influence of affect on the working self-concept. *Cognition and Emotion, 27*(6), 1073–1090.

Joiner, J. T. E. (1995). The price of soliciting and receiving negative feedback: Self-verification theory as a vulnerability to depression theory. *Journal of Abnormal Psychology, 104*(2), 364–372.

Joshanloo, M. (2018). Gender differences in the predictors of life satisfaction across 150 nations. *Personality and Individual Differences, 135*, 312–315. https://doi.org/10.1016/j.paid.2018.07.043

Kapikiran, S. (2012). Loneliness and life satisfaction in Turkish early adolescents: The mediating role of self-esteem and social support. *Social Indicators Research, 111*(2), 617–632.

Kong, F., Hu, S. Y., & WangSongLiu, X. Y. Y. J. (2015). Neural correlates of the happy life: The amplitude of spontaneous low frequency fluctuations predicts subjective well-being. *NeuroImage, 107*, 136–145. https://doi.org/10.1016/j.neuroimage.2014.11.033

Leung, J.-P., & Leung, K. (1992). Life satisfaction, self-concept, and relationship with parents in adolescence. *Journal of Youth and Adolescence, 21*(6), 653–665.

Levey, E., Garandeau, C. F., Meeus, W., & Branje, S. (2019). The longitudinal role of self-concept clarity and best friend delinquency in adolescent delinquent behavior. *Journal of Youth and Adolescence, 48*, 1068–1081. https://doi.org/10.1007/s10964-019-00997-1

Light, A. E. (2018). Self-concept clarity, self-regulation, and psychological well-being. In J. Lodi-Smith & K. G. DeMarree (Eds.), *Self-Concept Clarity: Perspectives on Assessment, Research, and Application.* Springer Press.

Liu, G., Zhang, D., Pan, Y., Hu, T., He, N., Chen, W., & Wang, Z. (2017). Self-concept clarity and subjective social status as mediators between psychological suzhi and social anxiety in Chinese adolescents. *Personality and Individual Differences, 108*, 40–44. https://doi.org/10.1016/j.paid.2016.11.067

Liu, Q. Q., Sun, X. J., Zhou, Z. K., Niu, G. F., Kong, F. C., & Lian, S. L. (2016). The effect of honest self-presentation in online social network sites on life satisfaction: The chain mediating role of online positive feedback and general self-concept. *Journal of Psychological Science, 39*(2), 406–411.

Lodi-Smith, J., Spain, S. M., Cologgi, K., & Roberts, B. W. (2017). Development of identity clarity and content in adulthood. *Journal of Personality and Social Psychology, 112*(5), 755–768.

Ma, C. Q., & Huebner, E. S. (2008). Attachment relationships and adolescents' life satisfaction: Some relationships matter more to girls than boys. *Psychology in the Schools, 45*(2), 177–190.

Marsh, H. W., Hau, K. T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling, 11*(3), 320–341.

Martin, C., Czellar, S., & Pandelaere, M. (2019). Age-related changes in materialism in adults-a self-uncertainty perspective. *Journal of Research in Personality, 78*, 16–24. https://doi.org/10.1016/j.jrp.2018.09.007

Massoni, S. (2014). Emotion as a boost to metacognition: How worry enhances the quality of confidence. *Consciousness and Cognition, 29*, 189–198. https://doi.org/10.1016/j.concog.2014.08.006

Matthews, G. (2018). Cognitive-adaptive trait theory: A shift in perspective on personality. *Journal of Personality, 86*(1), 69–82.

Moksnes, U. K., & Espnes, G. A. (2012). Self-esteem and emotional health in adolescents–gender and age as potential moderators. *Scandinavian Journal of Psychology, 53*(6), 483–489.

Na, J., Chan, M. Y., Lodi-Smith, J., & Park, D. C. (2018). Social-class differences in self-concept clarity and their implications for well-being. *Journal of Health Psychology, 23*(7), 951–960.

Nezlek, J. B., & Plesko, R. M. (2001). Day-to-day relationships among self-concept clarity, self-esteem, daily events, and mood. *Personality and Social Psychology Bulletin, 27*(2), 201–211.

Nie, Q., Teng, Z., Bear, G. G., Guo, C., Liu, Y., & Zhang, D. (2019). Hope as mediator between teacher–student relationships and life satisfaction among Chinese adolescents: A between-and within-person effects analysis. *Journal of Happiness Studies*. https://doi.org/10.1007/s10902018-0052-6

Orehek, E., Bessarabova, E., Chen, X., & Kruglanski, A. W. (2011). Positive affect as informational feedback in goal pursuit. *Motivation and Emotion, 35*(1), 44–51.

Parise, M., Canzi, E., Olivari, M. G., & Ferrari, L. (2019). Self-concept clarity and psychological adjustment in adolescence: The mediating role of emotion regulation. *Personality and Individual Differences, 138*, 363–365. https://doi.org/10.1016/j.paid.2018.10.023

Posavac, S. S., & Posavac, H. D. (2020). Adult separation anxiety disorder symptomology as a risk factor for thin-ideal internalization: The role of self-concept clarity. *Psychological Reports, 123*(3), 674–686. https://doi.org/10.1177/0033294119829440

Ritchie, T. D., Sedikides, C., Wildschut, T., Arndt, J., & Gidron, Y. (2011). Self-concept clarity mediates the relation between stress and subjective well-being. *Self and Identity, 10*(4), 493–508.

Sang, Q., Ge, M., & Yao, Q. (2007). The relationship of college students' self-consistency congruence with life stress and life satisfaction. *Psychological Science, 30*(3), 552–255.

Sawyer, S. M., Azzopardi, P. S., Wickremarathne, D., & Patton, G. C. (2018). The age of adolescence. *The Lancet Child & Adolescent Health, 2*(3), 223–228.

Sayer, A. G., & Cumsille, P. E. (2001). Second-order latent growth models. In L. M. Collins & A. G. Sayer (Eds.), *New methods in the analysis of change*. Washington, DC: APA Publications.

Schwartz, S. J., Klimstra, T. A., Luyckx, K., Hale, W. W., Frijns, T., Oosterwegel, A., Van Lier, P. A. C., Koot, H. M., & Meeus, W. H. J. (2010). Daily dynamics of personal identity and self-concept clarity. *European Journal of Personality, 25*(5), 373–385.

Schwartz, S. J., Klimstra, T. A., Luyckx, K., Hale, W. W., III., & Meeus, W. H. J. (2012). Characterizing the self-system over time in adolescence: Internal structure and associations with internalizing symptoms. *Journal of Youth and Adolescence, 41*(9), 1208–1225.

Seidlitz, L., Wyer, R. S., & Diener, E. (1997). Cognitive correlates of subjective well-being: The processing of valenced life events by happy and unhappy persons. *Journal of Research in Personality, 31*(2), 240–256.

Seo, M., & Ilies, R. (2009). The role of self-efficacy, goal, and affect in dynamic motivational self-regulation. *Organizational Behavior and Human Decision Processes, 109*(2), 120–133.

Suh, E. M. (2002). Culture, identity consistency, and subjective well-being. *Journal of Personality and Social Psychology, 83*(6), 1378–1391.

Taylor, D. M. (1997). The quest for collective identity: The plight of disadvantaged ethnic minorities. *Canadian Psychology, 38*(3), 174–189. https://doi.org/10.1037/0708-5591.38.3.174

Teng, Z. J., Pontes, H. M., Nie, Q., Xiang, G. C., Griffiths, M. D., & Guo, C. (2020b). Internet gaming disorder and psychosocial well-being: A longitudinal study of older-aged adolescents and emerging adults. *Addictive Behaviors*. https://doi.org/10.1016/j.addbeh.2020.106530

Teng, Z. J., Griffiths, M. D., Nie, Q., Xiang, G. C., & Guo, C. (2020a). Parent-adolescent attachment and peer attachment associated with Internet gaming disorder: A Longitudinal study of first-year undergraduate students. *Journal of Behavioral Addictions, 9*(1), 116–128.

Thayer, R. E., Newman, R., & McClain, T. M. (1994). Self-regulation of mood: Strategies for changing a bad mood, raising energy, and reducing tension. *Journal of Personality and Social Psychology, 67*(5), 910–925.

Usami, S. (2021). On the differences between general cross-lagged panel model and random-intercept cross-lagged panel model: Interpretation of cross-lagged parameters and model choice. *Structural Equation Modeling: A Multidisciplinary Journal, 28*(3), 331–344.

Usborne, E., & Taylor, D. M. (2010). The role of cultural identity clarity for self-concept clarity, self-esteem, and subjective well-being. *Personal and Social Psychological Bulletin, 36*(7), 883–897.

van Dijk, M. P., Branje, S., Keijsers, L., Hawk, S. T., Hale, W. W., & Meeus, W. (2014). Self-concept clarity across adolescence: Longitudinal associations with open communication with parents and internalizing symptoms. *Journal of Youth and Adolescence, 43*(11), 1861–1876.

Waring, A., Kernes, J. L., & Bui, N. H. (2019). The role of attachment anxiety, attachment avoidance, and grit on life satisfaction and relationship satisfaction. *Journal of Humanistic Psychology*. https://doi.org/10.1177/0022167819844692

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070.

Xiang, G. C., Teng, Z. J., Li, Q. Q., Chen, H., & Guo, C. (2020b). The influence of perceived social support on hope: A longitudinal study of older-aged adolescents in China. *Children and Youth Services Review, 119*, 105616. https://doi.org/10.1016/j.childyouth.2020.105616

Xiang, G. C., Chen, H., Wang, Y. L., & Li, Q. Q. (2021). Self-concept clarity associated with subjective well-being in adolescents: A latent profile analysis. *Journal of Southwest University Social Sciences Edition, 47*(2), 153–160+229.

Xiang, G. C., Li, Q. Q., Du, X. L., Liu, X. Y., Liu, Y., & Chen, H. (2022a). Knowing who you are: Neural correlates of self-concept clarity and Happiness. *Neuroscience, 490*, 264–274.

Xiang, G. C., Li, Q. Q., Du, X. L., Liu, X. Y., Xiao, M. Y., & Chen, H. (2020a). Links between family-cohesion and subjective well-being in adolescents and early adults: The mediating role of self-concept clarity and hope. *Current Psychology, 41*(1), 76–85.

Xiang, G. C., Li, Q. Q., Li, X. B., & Chen, H. (2022b). Development of self-concept clarity from ages 11 to 24: Latent growth models of Chinese adolescents. *Self and Identity*. https://doi.org/10.1080/15298868.2022.2041478

Yang, J., Huebner, E. S., & Tian, L. (2022). Transactional processes among childhood maltreatment, self-control and aggression in early adolescence: Disentangling between-and within-person associations. *Research on Child and Adolescent Psychopathology, 50*(3), 321–334.

Ybrand, H. (2008). The relation between self-concept and social functioning in adolescence. *Journal of Adolescence, 31*(1), 1–16.

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