Quality of Life Research (2018) 27:2137–2145
https://doi.org/10.1007/s11136-018-1865-9

Directionality of the relationship between social well-being and subjective well-being: evidence from a 20-year longitudinal study

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Accepted: 25 April 2018 / Published online: 30 April 2018

Abstract

Purpose Self-determination theory suggests that psycho-social well-being prospectively predicts subjective well-being. In contrast, the broaden-and-build theory of positive emotions suggests that subjective well-being has a positive impact on subsequent levels of psycho-social well-being. The present study sought to empirically disentangle the directionality of the relationship between subjective well-being and social well-being over time.

Methods The study used three waves of survey data, with intervals of 10 years, from the Midlife in the United States (MIDUS) project, a representative longitudinal panel study of American adults ($N = 2732$). Cross-lagged panel modeling was used for data analysis.

Results The results revealed that social well-being predicted increases in subsequent subjective well-being, whereas subjective well-being did not prospectively predict social well-being. Social well-being also demonstrated more stability over time than did subjective well-being.

Conclusion These findings suggest that optimal social functioning is more likely to be an antecedent to subjective well-being, not the other way around. The results are consistent with predictions guided by self-determination theory.

Keywords Subjective well-being · Social well-being · Longitudinal · Hedonic well-being · Eudaimonic well-being

Introduction

According to the tripartite model of mental well-being [28, 39, 40], mental well-being is a multidimensional construct involving the three dimensions of subjective, psychological, and social well-being. Subjective well-being includes the presence of positive affect and satisfaction as well as the absence of negative affect (e.g., [16, 17]). Psychological well-being focuses on personal growth and development, involving such dimensions as self-acceptance and purpose in life [56]. Social well-being [36] reflects positive aspects of human well-being through interaction with other people and the community at large. This construct involves the five dimensions of social acceptance (i.e., positive attitude toward people in general, understanding and accepting people's humanity and complexity), social actualization (i.e., positive attitude toward society and societal progress and development, belief that the growth of society is based on cooperation and collective efforts of people), social contribution (i.e., belief that one's life contributes to society and such contribution is recognized by the collective), social coherence (i.e., belief that society and its various institutions are meaningful and well intentioned to foster well-being for the collective), and social integration (i.e., a sense of belonging to a community and feelings of support and comfort from group identification). Subjective well-being captures the hedonic aspect of well-being, whereas psychological and social well-being capture the eudaimonic or functioning aspects of well-being [39]. The three dimensions of subjective, psychological, and social well-being are correlated but also empirically distinct (e.g., [28, 31–33, 37, 40, 55, 59]).

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s11136-018-1865-9) contains supplementary material, which is available to authorized users.

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Joshanloo [30] investigated the longitudinal relationships between psychological well-being and subjective well-being in a large American sample. The results revealed that, whereas psychological well-being unequivocally predicted increases in subjective well-being over one and two decades, the prospective effects of subjective well-being on psychological well-being were inconsistent (i.e., positive, negative, or non-significant) across various time points. The longitudinal relationship between social and subjective well-being has not received any research attention. The primary purpose of the present study is to explore how social well-being (the social aspect of functioning well-being) and subjective well-being influence each other over time.

Based on self-determination theory [14], one can predict that social well-being is an antecedent of subjective well-being. Specifically, DeHaan and Ryan [15] state that "certain activities and lifestyles, particularly those associated with eudaimonic living, supply the most reliable paths to happiness and positive affect" (p. 40). Self-determination theory regards high subjective well-being as a sign that the person is functioning well, not as a predominant cause of optimal functioning per se. According to this theory, a fully functioning individual is one who is authentically in touch with his or her internal state and social environment, which involves the satisfaction of basic psychological and social needs [14]. An important need highlighted by self-determination theory is relatedness, reflecting elements of social well-being. Optimal social relationships with one's group and the community are considered a fundamental human need by other psychological theories as well (e.g., [3]). Thus, self-determination theory would predict that social well-being (along with psychological well-being) is more likely to prospectively predict subjective well-being than the other way around [30].

Keyes and his colleagues (e.g., [9, 59]) conceptualize social well-being in terms of social adjustment. That is, individuals high on social well-being are those who are well adjusted to their social environment and possess skills and beliefs that help them develop a healthy relationship with the broader society. There is much evidence suggesting that social adjustment is a concurrent predictor of subjective well-being (e.g., [4, 18, 42, 53]). Furthermore, the concept of social capital, which involves a general trust in others, overlaps significantly with Keyes' concept of social well-being. There is much cross-sectional evidence suggesting that social capital influences subjective well-being (e.g., [5, 10, 27, 54]). As such, the sociological literature has generally treated social adjustment, capital, and trust as predictors of subjective well-being, not the other way around.

In contrast, the broaden-and-build theory [21] suggests that positive emotions build personal resources and fuel psychological resilience and well-being over time. Accordingly, subjective well-being may play an important role in developing important personal and social skills (i.e., psycho-social well-being) over time [30]. The longitudinal and experimental evidence reviewed by Lyubomirsky, King, and Diener [44] indicates that subjective well-being exerts a causal effect on a variety of behavioral outcomes related to social well-being such as interest and engagement in prosocial activities (e.g., volunteering and helping), interest in social activities, and interest in being with friends. Thus, from this perspective, subjective well-being can also be an antecedent to subsequent social well-being.

The present study

The reviewed evidence suggests that subjective and social well-being could mutually predict each other over time. However, the mutual relationship between the two variables has never been empirically tested. The current longitudinal study examines the directionality of the relationship between the two constructs. An empirical exploration of this relationship may show that one of the constructs predict subsequent levels of the other; the two constructs mutually influence subsequent levels of each other, or none of the two predict increases or decreases in subsequent levels of the other. The present study employed large survey data involving three waves collected over a period of 20 years in the United States to explore this relationship. Cross-lagged panel analysis [43] was used, which is well suited to answer our research questions. Cross-lagged panel analyses help investigate autoregressive effects (linking a variable at earlier time points to itself at later time points) and cross-lagged effects (linking two different variables across time). Estimates of the autoregressive effects provide insights on the stability of the constructs over time. The cross-lagged component of the model provides a test of the directionality of relationship between the two constructs [50, 58].

Methods

Participants

Data used in this study were extracted from the first (collected in 1995–1996), second (2004–2006), and third (2013–2014) waves of the Midlife in the United States (MIDUS) project [57]. The integrated data file for the three waves includes 7108 participants. However, for the purposes of this study, only individuals who completed the survey three times were included. The final sample of the study consisted of 1223 (44.5%) males and 1509 females. Among the 2732 participants included in the analysis, 2629 (89.7%) had complete data on all of the variables of the study, whereas 103 participants had 1–7 missing values. The average age was 46.53 years ($SD = 11.24$, ranging between 20 and 74)

at Time 1 and 64.53 years ($SD = 11.19$, ranging between 39 and 93) at Time 3. Of the sample, 91.1% were white; 5.5% belonged to other races or were multiracial, and race information was missing for 3.4% of the participants. At Time 1, 95% of the sample were US citizens, 0.8% were not US citizens, and citizenship information was missing for 4.2% of the sample. At Time 1, 6% of the sample had some grade school to GED education, 25% had graduated high school; 29.4% had some college education (no bachelor's degree); 39.5% had graduate college to doctorate or professional degrees.

Measures

Life satisfaction

Life satisfaction was assessed using five items capturing satisfaction with overall life, work, health, relationship with spouse/partner, and relationship with children [28]. Each item was coded from *the worst possible* (0) to *the best possible* (10). The scale is provided in the electronic supplementary material.

Positive/negative affect

The 12-item Negative and Positive Affect Scale (NAPAS) was used to measure affect [29, 48]. Using a scale from (recoded) *none of the time* (1) to *all* (5), respondents indicated how often during the past 30 days they felt six positive and six negative affective states.

Social well-being

The 14-item version of the Keyes' [36] social well-being scale was used. Items were scored on a 7-point Likert scale varying from *strongly disagree* (1) to *strongly agree* (7). Due to unacceptable internal consistency (alphas ranging between 0.391 and 0.427 across the three time points), the social acceptance dimension was dropped from the analysis. The four dimensions used in the study were social coherence, social integration, social contribution, and social actualization, each measured with two or three items.

Composite scores for the variables of the study were computed by summing or averaging the item scores for each variable. Alphas and descriptive statistics are reported in Table 1. As shown in the table, the alpha coefficients reflecting construct reliability were all within the acceptable range (0.63 − 0.91), considering the brevity of the scales.

Statistical analysis

Longitudinal confirmatory factor analyses and bi-directional cross-lagged panel analyses were conducted in Mplus 8 with Robust Maximum Likelihood (MLR). Full information maximum likelihood (FIML) was used to handle missing data. FIML is among the most efficient and highly recommended

Table 1 Descriptive statistics and alphas

Wave	Variable	*M*	*SD*	Skewness	Kurtosis	α
1	Social coherence	9.253	3.179	−0.172	−1.024	0.639
	Social integration	14.471	4.340	−0.638	−0.293	0.761
	Social contribution	16.047	3.650	−0.705	0.190	0.681
	Social actualization	12.269	4.194	−0.164	−0.629	0.675
	Negative affect	1.506	0.584	1.921	5.067	0.863
	Positive affect	3.416	0.702	−0.698	0.486	0.906
	Life satisfaction	7.819	1.178	−0.877	1.276	0.654
2	Social coherence	9.399	3.029	−0.157	−0.830	0.638
	Social integration	14.886	4.006	−0.537	−0.254	0.765
	Social contribution	16.033	3.530	−0.534	−0.176	0.702
	Social actualization	12.860	3.970	−0.145	−0.474	0.675
	Negative affect	1.476	0.531	1.844	4.184	0.838
	Positive affect	3.460	0.686	−0.634	0.555	0.902
	Life satisfaction	7.851	1.166	−1.035	2.037	0.628
3	Social coherence	9.112	3.123	−0.051	−0.884	0.669
	Social integration	14.735	4.077	−0.502	−0.243	0.788
	Social contribution	15.470	3.709	−0.422	−0.265	0.724
	Social actualization	11.697	4.057	0.040	−0.437	0.702
	Negative affect	1.468	0.580	1.929	4.476	0.846
	Positive affect	3.440	0.717	−0.648	0.541	0.910
	Life satisfaction	7.801	1.308	−1.158	1.826	0.632

methods to handle missing data in structural equation modeling [23]. The four social well-being variables were used as the indicators of the social well-being factors at three time points. The latent variables of subjective well-being were captured by indicators of life satisfaction, positive affect, and (reversed) negative affect across the three time points. To evaluate model fit, we used several fit indices. Customarily, a minimum cutoff of 0.90 for the Comparative Fit Index (CFI), a maximum cutoff of 0.08 for Root Mean Square Error of Approximation (RMSEA), and a maximum cutoff of 0.08 for Standardized Root Mean Square Residual (SRMR) are considered indicative of acceptable fit (e.g., [6]). Smaller values of Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) indicate better fit.

To establish measurement reliability, metric and scalar invariance across time were examined using confirmatory factor analysis (CFA). Together, longitudinal metric and scalar invariance indicate that the measurement properties of the latent variables are stable over time, and the changes in the latent variables are not due to the changing measurement properties [50]. After establishing measurement invariance, bi-directional cross-lagged panel models were tested to investigate the reciprocal causal relationships between social well-being and subjective well-being over time. Finally, in a separate cross-lagged model, the classic demographic variables of gender, age, and the quadratic term of age (i.e., age^2) were added to the model to control for their effects.

Results

A CFA involving all of the social well-being and subjective well-being variables with covariance between them was first tested. All autocorrelations among measurement residuals across time were also estimated. The model fitted the data well (see Model 1 in Table 2). Next, the longitudinal measurement invariance of the model was examined. Changes in the CFI values less than 0.01 (i.e., a $\Delta CFI < 0.01$) were considered as indicative of measurement invariance [7]. Full metric invariance (Model 2) was supported ($\Delta CFI = 0.000$). The ΔCFI value of the full scalar invariance model (Model 3) was -0.009 which is very close to the 0.01 cutoff point. Moreover, the model yielded a relatively large modification index for the intercept of social integration. Consequently, the constraints on the intercept of this variable over time were relaxed. The modified model (Model 4) fitted the data well providing support for partial scalar invariance ($\Delta CFI = -0.004$). Holding the equality constraints, all of the non-synchronous covariance relationships were converted into directional predictive paths (Model 5). Given that the structural portion of this model is saturated, model fit does not indicate the accuracy of the directional paths. To build a more parsimonious model, non-significant directional paths were dropped one at a time in a sequence of models [43, 50]. Model pruning resulted in the final model of the study (Model 6). Notably, all of the cross-lagged effects from subjective well-being were non-significant, and thus were dropped. The parameter estimates of the final model are shown in Table 3. The final model is also shown in Fig. 1, including the standardized regression coefficients.

The synchronous correlations between social well-being and subjective well-being at Time 1 and between their residuals at Time 2 and 3 were positive and significant. The autoregressive paths were also all significant. The autoregressive paths between the non-adjacent time points were substantially weaker than those between the adjacent time points. This means that the stability of subjective and social well-being decline with time, which is to be expected. The cross-lagged effects of subjective well-being on social well-being were dropped due to being non-significant, whereas the two cross-lagged effects of social well-being

Table 2 Fit indices

Model	χ^2	df	CFI	SRMR	AIC	BIC	RMSEA	90% CI for RMSEA	
								Low	Up
1 CFA model	893.2	153	0.963	0.040	203995.0	204580.4	0.042	0.039	0.045
2 Metric invariance	912.7	163	0.963	0.043	204005.0	204531.3	0.041	0.038	0.044
3 Scalar invariance	1103.2	173	0.954	0.046	204193.2	204660.3	0.044	0.042	0.047
4 Partial scalar invariance	1003.4	171	0.959	0.044	204086.0	204565.0	0.042	0.040	0.045
5 Saturated cross-lagged model	1003.4	171	0.959	0.044	204086.0	204565.0	0.042	0.040	0.045
6 Final cross-lagged model	1010.7	175	0.959	0.044	204086.9	204542.2	0.042	0.039	0.044
7 Final cross-lagged model with covariates	1447.3	220	0.943	0.048	203834.2	204395.9	0.045	0.043	0.047

All χ^2 values are significant at $p < 0.001$

CFI comparative fit index, *RMSEA* root mean square error of approximation, *SRMR* standardized root mean square residual, *AIC* akaike information criterion, *BIC* Bayesian information criterion, *CI* confidence interval

Table 3 Standardized estimates for model 6 (without covariates)

	Estimate	95% CI	
		Low	Up
Regression paths			
SOWB1 → SOWB3	0.192***	0.115	0.269
SOWB2 → SOWB3	0.605***	0.533	0.677
SOWB2 → SWB3	0.136***	0.082	0.189
SWB1 → SWB3	0.216***	0.156	0.277
SWB2 → SWB3	0.497***	0.428	0.567
SOWB1 → SOWB2	0.746***	0.713	0.779
SOWB1 → SWB2	0.115***	0.055	0.176
SWB1 → SWB2	0.571***	0.513	0.630
Covariances			
SOWB1 ← → SWB1	0.591***	0.546	0.635
SOWB2 ← → SWB2	0.464***	0.404	0.525
SOWB3 ← → SWB3	0.390***	0.324	0.456
R^2			
SOWB3	0.576***		
SWB3	0.553***		
SOWB2	0.556***		
SWB2	0.417***		

SOWB social well-being, *SWB* subjective well-being, *CI* confidence interval

***$p < 0.001$

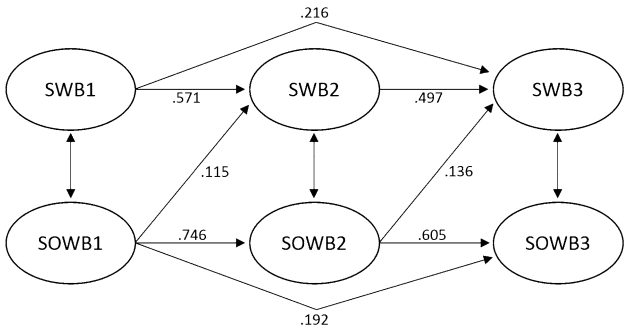

Fig. 1 Model 6 (without covariates). *SOWB* social well-being. SWB = subjective well-being. The numbers are standardized regression coefficients for autoregressive and cross-lagged paths (all significant at $p < .001$, as shown in Table 3). The factor indicators are not shown in the figure for the sake of clarity

on subjective well-being were significant and thus retained. This suggests that when the initial levels of the variables are controlled for, subjective well-being does not prospectively predict social well-being, whereas social well-being prospectively predicts subjective well-being. Finally, in a separate model (Model 7), all of the six factors were regressed on the demographic variables. As can be seen in Table 4, adding the covariates had nearly no effect on the parameter estimates. Therefore, the effects observed in Model 6 cannot

Table 4 Standardized estimates for model 7 (with covariates)

	Estimate	95% CI	
		Low	Up
Regression paths			
SOWB1 → SOWB3	0.210***	0.132	0.288
SOWB2 → SOWB3	0.598***	0.524	0.672
SOWB2 → SWB3	0.126***	0.069	0.182
SWB1 → SWB3	0.230***	0.170	0.291
SWB2 → SWB3	0.500***	0.427	0.572
SOWB1 → SOWB2	0.747***	0.713	0.781
SOWB1 → SWB2	0.122***	0.061	0.183
SWB1 → SWB2	0.545***	0.484	0.606
Covariances			
SOWB1 ← → SWB1	0.597***	0.553	0.641
SOWB2 ← → SWB2	0.484***	0.424	0.545
SOWB3 ← → SWB3	0.394***	0.328	0.461
R^2			
SOWB3	0.599***		
SWB3	0.562***		
SOWB2	0.562***		
SWB2	0.431***		
SOWB1	0.010*		
SWB1	0.039***		

SOWB social well-being, *SWB* subjective well-being, *CI* = confidence interval

*$p < 0.05$. ***$p < 0.001$

Table 5 Standardized regression coefficients for model 7

	Female	Age	Age^2
SOWB3	0.037*	−0.122***	−0.023
SWB3	0.028	−0.008	−0.100***
SOWB2	−0.041	−0.033	−0.027
SWB2	−0.014	0.123***	−0.018
SOWB1	−0.039	0.080**	−0.057**
SWB1	−0.049	0.165***	0.076***

SOWB social well-being, *SWB* subjective well-being. Age^2 = the quadratic term of age

*$p < 0.05$, **$p < 0.01$, *** $p < 0.001$

be explained by gender and age effects. Table 5 shows that these covariates are not strong predictors of well-being.

Discussion

Some classic and modern thinkers of public welfare have criticized the hedonic conceptualization of well-being for its association with egotism, overconsumption of luxury goods, lack of social responsibility, and lack of motivation

to pursue the larger social good [47]. These thinkers have emphasized that true happiness emerges from devotion to the public good, not the pursuit of a pleasant life. For them, the happiness of an individual should not be separated from the happiness of society as a whole and hedonistic happiness must be subservient to the broader collective good of society. In contrast, other philosophers and ethicists have been less suspicious of hedonic well-being. For example, utilitarian philosophers have argued that pleasure and happiness play a significant role in both individual and societal welfare [49]. Similarly, the social and behavioral sciences have embraced a much more positive view of subjective well-being [12]. Empirical research has documented a large number of real-life benefits caused by subjective well-being (see reviews in [34, 60]).

Yet, the longitudinal effects of subjective well-being on social well-being have not been explicitly investigated in past research. The results of the present study show that whereas social well-being prospectively predicts subjective well-being, subjective well-being does not predict social well-being over time. The findings are consistent with self-determination theory that regards psycho-social functioning as a causal antecedent of subjective well-being. Although high subjective well-being may signify optimal functioning, the results of the study reported here suggest that subjective well-being is less likely to causally precede social functioning in the long term. This, of course, does not mean that subjective well-being is not beneficial given that subjective well-being was found to positively predict its own future levels. Therefore, maintaining higher levels of subjective well-being is beneficial in its own right.

The study found no prospective effects of subjective well-being on social well-being as all of the cross-lagged effects from subjective well-being were non-significant. This result is not consistent with predictions deduced from the broaden-and-build theory of positive emotions [21]. The present finding is consistent with another recent finding revealing ambiguous and weak prospective effects for subjective well-being on psychological well-being [30]. Therefore, it can be concluded that the functioning aspects of well-being are more likely to causally precede hedonic well-being, than the other way around.

A large body of research has documented the positive influence of subjective well-being on various life outcomes (e.g., [34, 60]). However, much of the research showing a positive prospective influence for subjective well-being has failed to control for levels of the eudaimonic aspects of well-being (i.e., optimal psych-social well-being). This may result in over-attributing causal agency to subjective well-being, when part or all of the effect is actually accounted for by optimal functioning. An illustrative example is Keyes and Simoes' [38] study using various well-being variables to predict mortality. They found that when examined alone, higher levels of emotional well-being predicted a reduced risk of premature mortality. However, when psychological well-being was included in the predictive model, much of the variance accounted for by emotional well-being was wiped out, and only psychological well-being predicted mortality successfully. These results in addition to the results of the present study suggest that research on the consequences of subjective well-being would greatly benefit from including the eudaimonic aspects of well-being to draw a more accurate picture of the prospective benefits of subjective well-being.

Available empirical evidence helps explain the rather weak and ambiguous prospective effects of subjective well-being on the functioning aspects of well-being. Subjective well-being is based on a hedonic conceptualization of well-being that emphasizes maximization of pleasure (e.g., positive affect) and minimization of pain (e.g., negative affect). As reviewed in Gruber, Mauss, and Tamir [25], there is a body of evidence challenging the positive effects of such hedonic experiences on psychological and social functioning. Experiencing positive affect is not always beneficial and may be associated with undesirable and unintended outcomes when the level of hedonia exceeds a certain threshold. In fact, extreme levels of positive affect may sometimes bring about adverse consequences. For example, experiencing very high degrees of positive emotions leads to a decrease in creativity [13] and an increased engagement in risky behaviors [11, 46]. As such, extreme levels of subjective well-being may lead to suboptimal life outcomes [24, 51].

Likewise, empirical studies suggest that experiencing negative affect is not always harmful to psychological functioning. Clinically, the absence or lack of negative emotions is associated with disorders such as psychopathy [20]. In interpersonal relationships, sharing painful experiences with others promotes interpersonal trust and team cooperation as it increases perceived bonding among members [2]. Other studies also suggest that acceptance of negative emotions can have long-term positive well-being consequences, given that accepting (vs. avoiding) negative emotions reduces anxiety and depressive symptoms (e.g., [35, 52]). It seems that the effects of experienced emotions on behavioral and cognitive outcomes are largely dependent upon context [25, 45]. In some contexts, the experience of positive emotions can lead to adverse consequences that may come to reduce general well-being in the long run. In other contexts, the experience of negative affect induces learning that helps one to adjust to the environment, thereby contributing to future optimal well-being. The context-dependency of subjective well-being offers an explanation for the results of the present study and Joshanloo's [30] study showing that subjective well-being is not a robust predictor of future optimal functioning. These findings suggest that research needs to

consider specific contexts of hedonic experience for a comprehensive understanding of its prospective effects. Thus, the existing evidence challenges the view that maximizing positive affect and minimizing negative affect *always* will lead to higher general well-being in the long run.

In addition to context, the prospective influence of emotions may also depend on the characteristics of the emotional experience other than valence. For example, research on attentional and cognitive consequences of emotions has highlighted the importance of differentiating high- versus low-intensity emotions. In a recent line of research, Gable and colleagues (e.g., [22, 26]) have shown that the influence of emotional experiences on cognition depends on the motivational intensity of the emotional experience. They found that, regardless of the valence, emotional experiences with low motivational intensity (e.g., gratitude, amusement, and sadness) are more likely to broaden the cognitive scope, whereas emotions associated with high motivational intensity (e.g., desire, fear, and stress) are more likely to narrow the cognitive scope. Given the brevity of the affective scales used in the present study, it was not possible to reliably measure various degrees of motivational intensity. Therefore, it remains for future research to examine the influence of motivational intensity in addition to valence on the prospective influence of affect.

It is also noteworthy that, as shown in Table 3, the autoregressive paths of social well-being were generally stronger than those of subjective well-being, indicating that social well-being is more stable over time than subjective well-being. This difference may be due to the fact that subjective well-being is largely based in emotional experiences that are quite variable by nature, whereas social well-being is anchored in more permanent skills and beliefs [30]. The results of Joshanloo's [30] recent study and the present results collectively suggest that the functioning aspects of well-being (psychological and social well-being) are more stable than hedonic well-being.

The study had some limitations that should be acknowledged. For example, the social well-being dimensions were measured using very short scales, yielding moderate internal consistencies. Social acceptance was dropped from the analysis due to an unacceptable alpha. It is not clear whether the results of the study will be replicated if other established scales of social well-being, affect, and life satisfaction are used. One can easily argue that longitudinal research is more effective than cross-sectional research is when testing causal directionality of relationships between constructs. Nevertheless, longitudinal research is certainly not a panacea. Behavioral scientists have long argued that causal inferences among the variables of particular longitudinal studies may be biased by a host of factors such as the demographic profile of the study participants as well as the historical, cultural, and environmental context of the studies (e.g., [1, 19]). As such, one longitudinal study cannot make assertive claims of causality. Such claims can only be made with multiple longitudinal studies involving various demographic profiles that may capture different historical, cultural, and environmental contexts. For example, research has shown that social values and concerns, as well as general principles that guide social relationships, change with age (e.g., [8, 41]). Although age was statistically controlled for in the present study, future studies can use younger samples to more explicitly examine the role played by age in the mutual relationship between social and subjective well-being.

Despite the clear advantages of cross-lagged panel models over cross-sectional studies for investigating causal precedence, it should be acknowledged that cross-lagged models of passive correlational data are imperfect tools for determining causal directionality "with certainty" [50, p. 147]. Longitudinal studies do not entirely rule out third-variable explanations. For example, uncontrolled factors might have contributed to the effects observed in the present study. Experimental designs can lead to more certainty about directionality and causal precedence, due to the fact that they are more efficient in minimizing potential confounding effects. Yet, experimental studies rarely span two decades, and it is always uncertain how much they can explain phenomena outside of the laboratory. All this said, a healthy approach is to apply multiple methods to investigate the same research question. Therefore, the present results should be considered preliminary until replicated in additional research using various research methods, scales, samples, and lag lengths.

Despite these limitations and the obvious need for additional research, it is hoped that the present results will contribute to improving future research endeavors of researchers studying strategies to improve mental well-being at individual and societal levels, and the prospective effects of various dimensions of well-being. The cumulative evidence from the current study and that from Joshanloo [30] suggests that the functioning aspects of well-being (psychosocial well-being) are quite stable factors which also influence subsequent levels of subjective well-being. Hence, this evidence should encourage mental health researchers and practitioners, as well as policymakers, to focus on eudaimonic well-being in developing programs of positive mental health. For maximum effect, programs designed to enhance mental well-being should be guided by a rich understanding of psychological and social well-being, rather than a one-sided focus on subjective well-being.

Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflict of interest

Ethical approval All procedures performed in this study are in accordance with the conventional ethical standards. We used the data from

the national survey of midlife development in the United States. For more information about the data collection procedures, see http://midus.wisc.edu/index.php.

Informed consent Informed consent has been obtained from all participants included in the study. For more information, see http://midus.wisc.edu/index.php.

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