

Social Contribution and Psychological Well-Being among Midlife Adults with Chronic Pain: A Longitudinal Approach

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Abstract

Objectives: Contributing to the welfare of others has been shown to have positive effects on people's social and psychological well-being (PWB). The current study examined whether social contribution (SC) could alleviate the negative effects of chronic pain on PWB through perceived social support (PSS) among midlife and older adults. **Methods:** The study consisted of 520 participants with chronic pain from the two waves of the Midlife in the United States dataset (MIDUS II and III). **Results:** Results from the longitudinal moderated mediation analysis indicated that SC at Time 2 (T2) significantly buffered the negative effect of pain interference (PI) at Time 1 (T1) on PSS at T2, which indirectly alleviated the negative effect of PI at T1 on PWB at T2. **Discussion:** The study suggested the protective role of SC and prosocial behaviors in mitigating the detrimental effects of chronic pain on social support and PWB.

Keywords

chronic pain, midlife, social support, social contribution, psychological well-being

The sense of being a useful and contributing member with something valuable to offer to society is one of the constituents of social well-being among midlife and older adults (i.e., social contribution (SC); Keyes, 1998). As Erikson (1968) indicated, one of the major concerns of midlife adults is to contribute to the well-being of their communities and future generations. The previous literature suggested that engagement in socially productive activities and prosocial behaviors are crucial for the wellness and life satisfaction among midlife and older adults (Gruenewald et al., 2012, 2016; Prilleltensky et al., 2001). Additionally, giving support to others has twice the effect of predicting favorable perceived health status compared to receiving support among older adults (e.g., Momtaz et al., 2014). Prosocial engagement also longitudinally predicts psychological well-being (PWB) and flourishing in life (Nelson et al., 2016). In contrast, older adults who reported lower levels of social usefulness were more likely to have an elevated risk of developing disabilities and dying in the four to six years following a pretest (Okamoto & Tanaka, 2004).

Although a growing body of literature has recognized the promising role of SC in the health and well-being of midlife and older adults (e.g., Gruenewald et al., 2012, 2016; Keyes, 1998; Nelson et al., 2016; Okamoto & Tanaka, 2004), there has been no detailed investigation into the extent to which SC

is beneficial for people with chronic pain. Approximately 43% of midlife and older adults in the United States have reported experiencing daily pain, with chronic pain being one of the most common health issues in this group (Bruckenthal et al., 2009; Reid et al., 2015). Furthermore, it has been conclusively shown that chronic pain is a multidimensional problem (e.g., Bevers et al., 2016; Meints & Edwards, 2018). Chronic pain patients do not only suffer from detrimental and persistent physical pain on a daily basis but they are also at a higher risk of mental health problems, social isolation, and especially, reduced PWB (Reid et al., 2015; Ryff et al., 2015). Given this multidimensional nature of chronic pain, the current literature has suggested that the combination of pharmacological treatment with psychosocial intervention yielded the most effective and positive results in terms of relieving physical symptoms as well as increasing individuals' social support and PWB (e.g., Deter, 2012; Sheinfeld Gorin et al., 2012). Even though the concept of PWB is originally the hallmark of the eudaimonic aspect of

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mental well-being, which consists of growth, self-actualization, and fulfillment (Ryan & Deci, 2001), many studies have revealed that it also has significant implications for physical health. In the pain management literature, PWB has significant and long-term effects on patients' quality of life, longevity, and their ability to recover and cope with chronic pain (Ryff et al., 2015). Thus, investigating the psychosocial factors that promote the PWB and holistic function of individuals with chronic pain remains a compelling need in pain management and health psychology research. Based on this need and previous literature on the benefits of SC, the scope of the current study was to examine the protective role of SC in social support and PWB among midlife and older adults with chronic pain.

Perceived Social Support as a Mediator

The biopsychosocial model of chronic pain demonstrates a multidimensional view of this illness, in which chronic pain negatively interferes with individuals' physical, social, and PWB (Gatchel et al., 2007; Turk & Monarch, 2002). Such interference is referred to as "pain interference (PI)," indicating the extent to which pain interferes with individuals' physical function, emotions, and social relationships (Cleeland & Ryan, 1994). PI is one of the common assessments of pain besides pain severity or intensity (Eslami et al., 2017; Jensen et al., 2017). Even though pain intensity is a more intuitive and straightforward assessment of pain as it directly measures its physical manifestation, it overlooks the multidimensional nature of pain and how pain manifests in other equally important aspects of life, such as emotion and social relationships (Cleeland & Ryan, 1994; Ezzati et al., 2019). Thus, the use of PI would be more appropriate within the biopsychosocial framework, as it reveals the "functional consequences" of pain in multiple domains of life (Ezzati et al., 2019; p. 2). When conceptualizing the biopsychosocial model of chronic pain among older adults, Miaskowski et al. (2019) denoted that PI is one of the main indicators and characteristics of chronic pain that affects multiple domains of individuals' lives, including social support and quality of life.

In fact, PI has also been found to be a "salient threat" to patients' psychosocial well-being (Mun et al., 2019, p. 246; Ryan & McGuire, 2016). Specifically, as chronic pain interferes with individuals' functions to a greater extent, they will experience more psychological distress and mobility problems, which prevent them from engaging in social activities and fulfilling social roles (Gold, 2001). Previous research also indicated that the pervasive and constant nature of chronic pain may consume a substantial portion of individuals' cognition and attention (Aldrich et al., 2000; Miller, 1993; Naliboff et al., 1983). As a result, it may be challenging for individuals in this group to equally devote their attention to other social aspects of their lives (Miller, 1993). All of these problems could be then associated with

increased risks of social withdrawal and interpersonal conflicts which would, in turn, negatively affect individuals' perceived social support (PSS) (Bruckenthal et al., 2009; Reid et al., 2015; West et al., 2012). *Perceived social support* is an individual's subjective perception and appraisal of the amount of support that they receive from significant social networks, such as spouses, nonspousal family members, and friends (Brooks et al., 2014; Walen & Lachman, 2000). It is the most frequently measured index of social support since several studies have revealed that PSS is a strong indicator of actual support utilization and mental health outcomes (Dour et al., 2014; Walen & Lachman, 2000).

The biopsychosocial model also emphasizes the longitudinal nature of chronic pain and posits that the interrelated and reciprocal relationships between chronic pain and psychosocial aspects (e.g., social support and PWB) should be understood in a longitudinal perspective throughout the life span rather than in a specific point in time (Turk & Monarch, 2002). In a review of 68 longitudinal studies, Dueñas et al. (2016) also demonstrated this point, in which chronic pain adversely interferes with individuals' physical and social functions in the long term, which sequentially predicts poor health-related quality of life and well-being over time (Dueñas et al., 2016). Thus, if chronic pain negatively interferes with interpersonal relationships and social support as discussed above, and a lack of social support predicts a decrease in PWB, it is plausible that social support could function as an indirect mechanism that explains how chronic pain deleteriously affects PWB over time.

Regarding the indirect effect of social support, Thoits (1985) stated that social support could mediate the relation between stressful events and psychological outcomes. Thoits (1985) view also aligns with the biopsychosocial-diathesis model of chronic pain (Bevers et al., 2016), which posits that psychosocial agencies, such as social support, could act as mediators in the association between PI as a predictor and PWB as an outcome of pain. However, when considering this as a whole mediation model, it is also possible that PI, PSS, and PWB could be mutually and bidirectionally associated with one another. For instance, a few studies have shown that lower levels of PWB could also be associated with increased levels of pain and decreased levels of social support (Feldman et al., 1999; Meints & Edwards, 2018). Thus, it might be challenging to determine the directionality of these constructs. However, according to the self-determination theory (Ryan & Deci, 2001), relatedness (i.e., the need to connect and belong in a positive relationship with one another) is one of the essential needs of human beings, and fulfilling this need is an *antecedent* of individuals' PWB. Hence, this theory suggested that social support is more likely to be the factor that fosters and contributes to PWB rather than the opposite. A study of Joshanloo et al. (2018) also supported this unreversed direction in which social well-being predicted an increase in subjective well-being.

Taken together, based on these theoretical frameworks and previous literature, social support is potentially a mediator in the association between pain and PWB. However, most of the previous studies in this line of research did not take PI into consideration (e.g., Ferreira & Sherman, 2007; López-Martínez et al., 2008) despite the relevance of PI to individuals' social support and PWB (Mun et al., 2019). More importantly, they did not test these associations in a longitudinal model that could offer valuable information about how chronic pain longitudinally affects individuals' psychosocial outcomes.

Social Contribution as a Moderator

SC is defined as “the belief that one is a vital member of society, with something of value to give to the world,” and it is one of the components of social well-being (Salehi et al., 2017, p. 83). Even though there is no solid evidence for whether SC could buffer the detrimental effects of PI on PSS, different studies have indicated the benefits of SC to fostering social relationships and well-being among midlife and older adults (e.g., Gruenewald et al., 2012; Son & Wilson, 2012; Waytz & Hofmann, 2020). One of the closely related concepts to SC among midlife and older adults is *generativity*, which stemmed from Erikson (1968) theory of psychosocial development. Specifically, the need to care and contribute to the next generation or, more generally, to be a productive member of one's community (i.e., generativity) is an important goal for midlife adults, and fulfilling this goal yields many positive outcomes for this group. Studies have shown that midlife and older adults who often engage in generative and prosocial activities would have fewer interpersonal conflicts, develop stronger social relationships, as well as receive more social support than those who do not (Ackerman et al., 2000; Westermeyer, 2004).

Another framework that supports the potential benefits of SC is the theoretical construct of *social capital*, which refers to the actual or potential resources that individuals could receive from being a member of social networks (Bourdieu, 1986). A substantial amount of literature has indicated the benefits of social capital to both physical and mental health (e.g., Almedom, 2005; Ziersch et al., 2005). One of the crucial ways that individuals could gain more social capital is through engagement in civic and prosocial activities (Kawachi, 2006; Kawachi et al., 2008). Through engaging in socially productive activities, individuals could gain a greater sense of significance, connectedness, and positive relationships with others (Joshnloo et al., 2018; Waytz & Hofmann, 2020; Weinstein & Ryan, 2010). Individuals with higher levels of social capital may also receive more resources, both tangible and nontangible support, from their community, which could substantially promote their psychological and physical well-being (Kawachi, 2006; Kawachi et al., 2008). In the context of chronic pain, a few studies indicated that the social support that stems from social capital may enhance individuals' resilience to cope with the illness (Yeung et al., 2012; Zautra et al., 2010). Taken together, the previous literature suggested that SC is indeed an important protective factor that could foster social support and well-being for midlife and older adults, even in the face of chronic illness. In other words, SC may buffer against the adverse effects of PI on PWB by moderating the negative effects of PI on social support.

Current Study

Based on theories and relevant empirical evidence as well as the gaps in the literature, the current study proposed a longitudinal moderated mediation model in which SC at Time 2 (T2) would moderate the indirect effect of PI at Time 1 (T1) on PWB at T2 through PSS at T2 (see Figure 1).

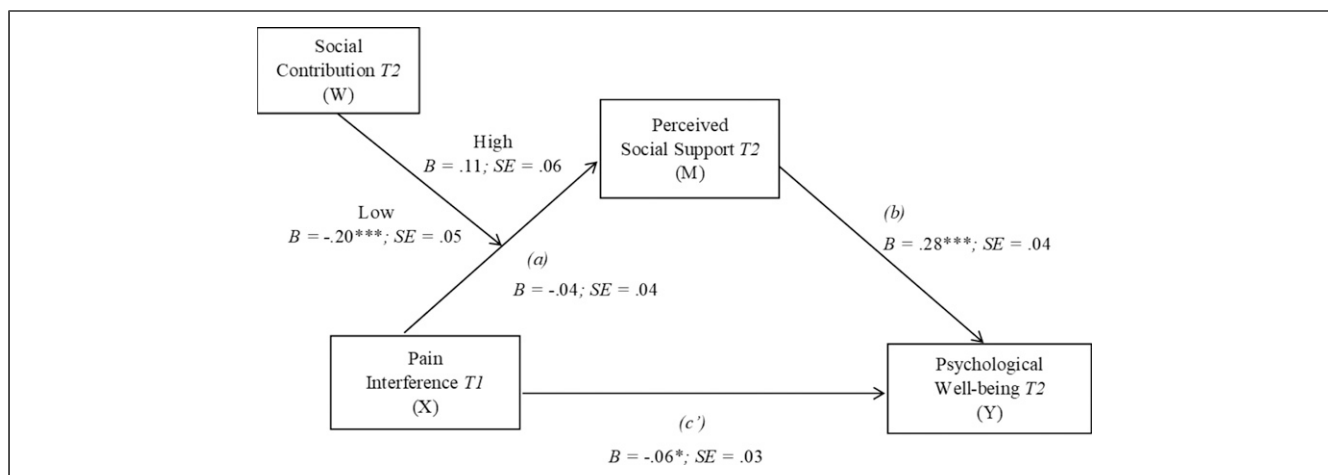


Figure 1. Moderated mediation model for the indirect effects of pain interference at T1 on psychological well-being at T2 through perceived social support at T2 moderating by social contribution at T2, while controlling for psychological well-being at T1. (Model 7; Hayes, 2017).

Note. * $p < .05$, ** $p < .01$, and *** $p < .001$.

Specifically, we first examined whether SC at T2 could significantly moderate or buffer against the negative association between PI at T1 and PSS at T2. Second, we examined whether the indirect effect of PI at T1 on PWB at T2 through PSS at T2 would be significantly different at multiple levels (i.e., high vs. low) of SC at T2. Based on past research, we anticipated that the adverse effect of PI on PWB through PSS would be attenuated at high levels of SC. Additionally, the study's use of the longitudinal model is not only well grounded in the longitudinal perspective of the biopsychosocial theory on chronic pain (Turk & Monarch, 2002) but it is also statistically sound, as cross-sectional studies often fail to offer the causal interpretations that mediation analysis implies (Maxwell & Cole, 2007). To increase the quality of this longitudinal model, the study also controlled for the stability effect by holding PWB at T1 constant. Not only controlling for stability effect is a gold standard in longitudinal research (Adachi & Willoughby, 2015) but it also allows the study to examine whether SC could actually predict meaningful changes in PWB over time at different levels of PI.

Even though the proposed model was strongly supported by a body of theory and empirical evidence, many scholars still hold the view that most multivariate and mediation analyses could have alternative plausible models (McDonald & Ho, 2002). For instance, it is plausible that SC could be associated with increased PWB (e.g., Waytz & Hofmann, 2020), and individuals with better mental health are more likely to have better social relationships and receive more social support (Proctor et al., 2009). To examine the possibility of this direction, we proposed an alternative moderated mediation model in which PWB at T2 was a mediator between PI at T1 and PSS at T2, while SC at T2 remained as a moderator. Furthermore, to test if SC in the past (at T1) yielded the same buffering effect as SC in the present (at T2), the study also tested another alternative moderated mediation model in which SC at T1 was a moderator, while all other variables remained to be the same as in the original model.

Methods

Participants

Participants were derived from the second Midlife Development in the United States (MIDUS II; Ryff et al., 2004–2006) and third (MIDUS III; Ryff et al., 2013–2014) waves of the longitudinal National Survey of MIDUS. Participants were recruited through telephone banks and were asked to complete both the telephone interview and mail-in surveys. Our study used the MIDUS II dataset as an initial point, as T1, which took place from 2004 to 2006, and followed by MIDUS III, as T2, which took place 9–10 years after MIDUS II, from 2013 to 2014. Additionally, there were 4963 respondents at MIDUS 2, and by the time of MIDUS 3, there were 3294 respondents

who participated in both waves with the retention rate of 77% after adjusting for mortality and ineligibility (Radler, 2014). The variable weights for MIDUS dataset were calculated using a poststratification weight after the data were collected (“Publicly Archived MIDUS Data,” 2011).

Among 3294 adults who participated in both waves, only 520 participants met the requirement of the current study, which was having pain that persisted beyond normal at both T1 and T2 (e.g., “Do you have pain that persists beyond the time of normal healing and has lasted from anywhere from a few months to many years?”). At T1, participants' age ranged from 34 to 83 years ($M = 56.75$, $SD = 10.71$) and 43 to 92 years at T2 ($M = 65.81$, $SD = 10.69$). Additionally, 38.7% of participants identified as male, and 61.3% of participants identified as female. In terms of ethnicity, 92.5% of participants identified as white, 3.4% as African American, 1.7% Native American, and 2.3% as others. In terms of marital and cohabitation status, 74.5% of participants at T1 and 64.2% of participants at T2 were married or cohabitating at the time of the survey.

Measures

PI. Participants' perceived level of interference from their chronic pain was assessed using a 5-item version of the Brief Pain Inventory's interference subscale (Cleeland & Ryan, 1994) from MIDUS II. The scale assessed perceived PI on one's life in the following domains: mood, general activity, enjoyment of life, sleep, and relations with others. Items (e.g., “During the past week, how much did your pain interfere with your relations with other people?”) were assessed on an 11-point scale (0 = *not at all* to 10 = *completely*). Responses were averaged to create an overall score, with higher scores indicating greater interference from pain. Regarding validity, scale scores were positively associated with pain severity, pain catastrophizing, anxiety, and depression (Ryan & McGuire, 2016). In a MIDUS sample with chronic pain, items yielded a Cronbach's α of .91 (Daheim et al., 2019). Scale items designated excellent internal consistency (Cronbach's $\alpha = .91$) in the present study.

PSS. Taken from MIDUS III, PSS was measured using the 14-item MIDUS Social Support Scale. Items (e.g., “How much do your friends really care about you?”) assess participants' PSS from friends, family, and spouse or partner since family and friends are the significant social networks among midlife and older adults (Walen & Lachman, 2000). For participants who reported not having a spouse or a partner, the total scores of social support were assessed via friend and family support. Responses were rated on a 4-point scale (1 = *not at all* to 4 = *a lot*) and averaged to create an overall score, with higher scores representing greater social support. Scale scores have been found to be negatively associated with perceived stress and relationship dissatisfaction (Park et al., 2017). In a MIDUS sample, internal consistency

was at least good for family ($\alpha = .82$), friends ($\alpha = .87$), and spouse/partner ($\alpha = .91$) items (Elliot et al., 2018). In the current study, both family support and friend support yielded good internal consistency (α 's = .87), while spouse support yielded excellent internal consistency ($\alpha = .92$).

PWB. Participants' PWB was assessed from MIDUS III using the 42-item MIDUS PWB Scale. The scale consists of six 7-item subscales including autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Item (e.g., purpose in life, "My daily activities often seem trivial and unimportant to me.") responses were scored using a 7-point Likert-type scale (1 = *strongly agree* to 7 = *strongly disagree*). Responses were summed to derive a scaled score, with higher scores signifying greater PWB. In a MIDUS sample, scale scores have been found to be positively associated with self-enhancement, optimism, social support, and subjective well-being (Chen et al., 2013). In the same sample, subscale Cronbach's alphas ranged from .70–.84, suggesting acceptable internal consistency. In the present study, items yielded a Cronbach's α of .89. To control for the stability effect or the initial levels of the outcome variable, participants' PWB at MIDUS II was also included as a covariate.

SC. SC was assessed using the 3-item SC subscale of Social Well-Being Scale from MIDUS III (Keyes, 1998). Participants responded to items (e.g., "I have something valuable to give to the world.") on a 7-point Likert-type scale ranging from *strongly disagree* to *strongly agree*. The scale score was calculated through the summation of items, with higher scores signifying greater perceived personal contribution to society. In a longitudinal MIDUS sample, items were found to have Cronbach's alphas ranging from .68–.73 across all three waves (Joshani et al., 2018). Further, SC was positively associated with social well-being, social coherence, social integration, and social actualization in the same sample. In the present study, an acceptable Cronbach's α of .70 was found.

Statistical Analysis

The proposed moderated mediation model was analyzed using PROCESS macro (Hayes, 2017) in SPSS Statistic 25 (IBM Corp, 2015). Specifically, this study used model 7 (Hayes, 2017) to examine whether SC at T2 (W) significantly moderated the association between PI at T1 (X) and social support at T2 (M) and whether SC at T2 (W) would also moderate the indirect effect of PI at T1 (X) on PWB at T2 (Y) through PSS at T2 (M), while controlling for PWB at T1. For a moderated mediation analysis, PROCESS also uses the method of 5000 bias-corrected bootstrapping. Results are deemed significant if 95% CI of the index of moderated mediation does not include zero, which indicates the indirect effect of X on Y through M significantly differs at different

levels of SC as a moderator. Additionally, the conditional indirect effect is also provided to allow researchers to interpret the extent to which the indirect effects differ at low, medium, and high levels of the moderator.

Results

Results for Moderated Mediation Model

Descriptive statistics, such as the mean and standard deviation, and bivariate correlations are displayed in Table 1. The regression coefficients of each pathway were demonstrated in Figure 1 and Table 2. The moderation analysis indicated that SC at T2 significantly buffered the negative association between PI at T1 and PSS at T2, as evident by the significant interaction effect of SC and PI on PSS ($B (SE) = .14 (.03)$, $p < .001$, 95% CI = [.07, .22]). The conditional effects showed that at the low level of SC ($-1 SD$), the negative association between PI at T1 and PSS at T2 was the strongest ($B (SE) = -.26 (.05)$, $p < .001$, 95% CI = [-.37, -.16]), whereas at the high level of SC ($+1 SD$), the association changed to positive, though it was not statistically significant ($B (SE) = .05 (.06)$, $p > .05$, 95% CI = [-.07, .17]). The graph of the interaction model illustrated that compared with participants with lower levels of SC at T2, those with higher levels of SC reported significantly greater levels of PSS at T2 at both low and high levels of PI at T1 (see Figure 2).

The moderated mediation results indicated that SC at T2 significantly moderated the mediation relations between PI at T1 and PWB at T2 through PSS at T2, while controlling for PWB at T1 ($index = .04$, $BootSE = .02$, 95% CI = [.01, .07]). Specifically, at low levels of SC at T2, the indirect effect of PI at T1 on PWB at T2 through PSS at T2 was significantly negative ($Effect = -.05$, $SE = .02$, 95% CI = [-.10, -.01]), whereas at high levels of SC, the indirect effect became positive, though it was not significant ($Effect = .03$, $SE = .02$, 95% CI = [-.01, .07]). As can be seen, the indirect effect of PI on PWB through perceiving social support seemed to increase (from $-.05$ to $.03$) as SC increased, as the slope of the line or the index of moderated mediation was positive (i.e., .4). When graphing the indirect effect at the low and high levels of the moderator, participants who had higher levels of SCs reported significantly higher levels of PWB at both low and high levels of PI (see Figure 3).

The sizes of the regression coefficients of the study are relatively small when compared to the general guidelines (e.g., Ferguson, 2009). However, the small effect size in the current study could be partly because of the control for the stability effect by holding the PWB at T1 constant. Given the stability effect, or the relationship between PWB at T1 and T2, is strong ($r = .7$, $p < .001$), controlling for this would remove a substantial portion of variance in the outcome variable, which may, in turn, significantly reduce the effect size of all of the regression paths. Thus, Adachi and

Table 1. Means, Standard Deviations, and Bivariate Correlations among Variables ($N = 522$).

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5
1. Pain interference at T1	-.004	.99					
2. Perceived social support at T2	-.001	1.0	-.21**				
3. Psychological well-being at T2	.02	.99	-.30**	.54**			
4. Social contribution at T2	.001	1.0	-.24**	.33**	.55**		
5. Psychological well-being at T1	.001	1.0	-.31**	.45**	.70**	.44**	

Note. * $p < .05$ and ** $p < .01$.

Table 2. Moderated Mediation Analyses for PI at T1 (X), PSS at T2 (M), SC at T2 (W), PWB at T2 (Y), and PWB at T1 (Covariate).

Regression path analysis						
Variable	<i>B</i>	<i>SE</i>	<i>p</i>	LLCI	ULCI	
PI (1) to PSS (2)	-.04	.04	.34	-.12	.04	
PI (1) × SC (2) to PSS (2)	.14	.04	<.001	.08	.25	
PSS (1) to PWB (2)	.50	.04	<.001	.43	.57	
PI (1) to PWB (2) through PSS (2)	-.06	.03	<.05	-.12	-.01	
PWB (1) to PWB (2)	.56	.03	<.001	.49	.62	
Conditional effects of PI on PSS at values of SC: moderation analysis						
GEN	Effect	<i>SE</i>	<i>p</i>	LLCI	ULCI	
Low	-.19	.05	<.001	-.29	-.08	
Medium	-.03	.04	.37	-.12	.04	
High	.11	.06	.07	-.01	.24	
Indirect effects of PI (1) on PWB (2) through PSS (2) at values of SC (2): moderated mediation analysis						
Index of moderated mediation = .04, boot SE = .02, 95% CI [.01, .07]						
GEN	Effect	Boot SE	LLCI	ULCI		
Low	-.05	.02	-.09	-.01		
Medium	-.01	.01	-.03	.01		
High	.03	.02	-.01	.07		

Note. PI = pain interference, PSS = perceived social support, PWB = psychological well-being, SC = social contribution, (1) = at time 1, (2) = at time 2, LLCI = lower level confidence interval 95%, ULCI = upper level confidence interval 95%.

Willoughby (2015) stated that rigidly applying common standards to evaluate the effect size for longitudinal studies might be misleading and inappropriate, as those general guidelines (e.g., Ferguson (2009)) did not specify its use for longitudinal autoregressive models that take stability effect into consideration. In this case, it is suggested that the effect size should be interpreted dynamically by considering stability effect rather than strictly relying on the universal standards. In the context of this study, even after removing a large portion of variance in the outcome variable by controlling for the stability effect, the model was still significant, suggesting that the changes in PWB due to SC at different levels of chronic pain are longitudinally meaningful.

Results for Alternative Models

In the first alternative moderated mediation model, SC at T2 was a moderator between the mediating association of PI at T1 (i.e., predictor) and PSS at T2 (i.e., criterion variable) through PWB at T2 (i.e., mediator). The result showed that the overall moderated mediation was no longer significant ($index = .017$, $BootSE = .02$, $95\% CI = [-.03, .09]$), and the moderation result was also not significant ($B (SE) = .03 (.04)$, $95\% CI = [-.04, .10]$). Thus, these findings suggested that our original model was more plausible with PSS as a mediator and PWB as a criterion variable. For the second alternative moderated mediation model, SC at T1 was used as the moderator. The results indicated that all the path analyses had

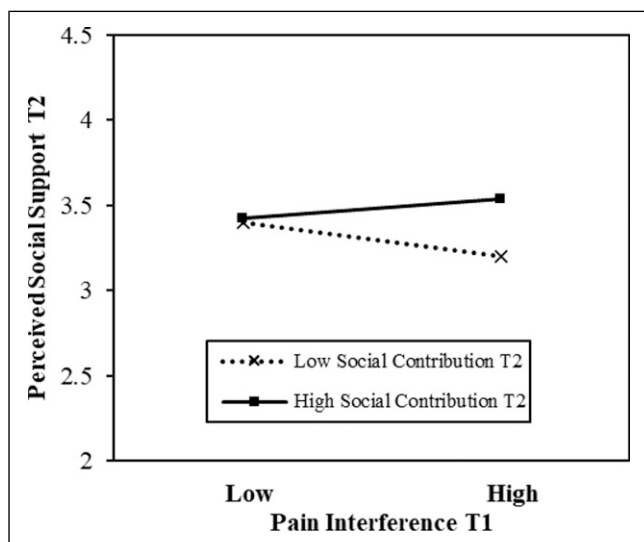


Figure 2. Moderation model for the effects of pain interference at T1 on perceived social support at T2 at low and high levels of social contribution at T2.

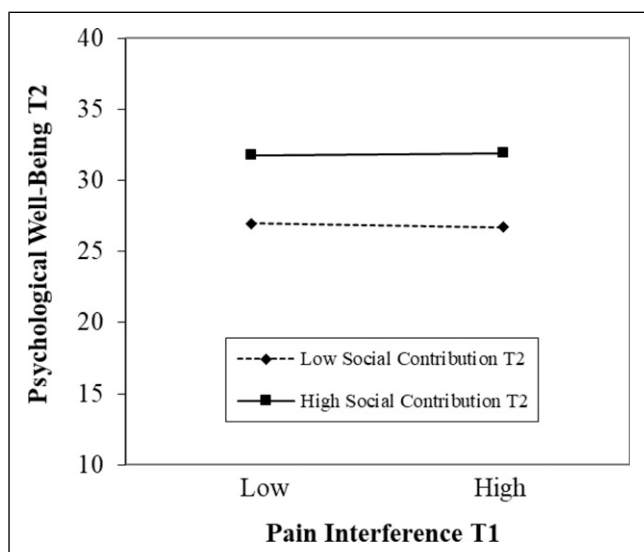


Figure 3. Indirect effect of pain interference at T1 on psychological well-being at T2 via perceived social support at T2 at the higher and lower levels of social contribution at T2, while controlling for psychological well-being at T1.

similar pattern to the original model; however, the overall moderated mediation effect was not significant ($index = .03$, $BootSE = .03$, $95\% CI = [-.02, .08]$).

Discussion

Investigating psychosocial factors that explain and promote PWB among individuals with chronic pain is a compelling need in both research and practice. In pain and health

psychology literature, PWB not only reflects individuals' quality of life but also affects their abilities to cope and recover from illness (Ryff et al., 2015). Previous studies have demonstrated that individuals with chronic pain, especially among older adults, usually experience a lack of social support, which is detrimental to their PWB (Reid et al., 2015). Meanwhile, a body of research has consistently suggested the benefits of socially productive activities, or SC, in fostering psychological and social well-being among midlife and older adults (e.g., Gruenewald et al., 2012, 2016; Nelson et al., 2016; Okamoto & Tanaka, 2004). However, there has been no empirical evidence for whether SC could buffer the negative associations of chronic pain with social support and PWB among midlife and older adults with chronic pain. To address this gap in research, the current study examined the longitudinal moderated mediation model involving PI, PSS, SC, and PWB.

The results showed support for the study's moderated mediation model. Specifically, the findings revealed that SC at T2 significantly buffered against the long-term and negative association between PI at T1 and PSS at T2. Specifically, participants who reported a greater sense of SC at T2 reported consistently higher levels of PSS at both low and high levels of PI at T1 compared to those who reported lower levels of SC. Notably, among those with high levels of SC, the association between PI and PSS changed from negative to positive. Even though this positive association was not significant, it suggests how SC may buffer against the detrimental effect of PI on PSS. This result could be explained by the theoretical construct of social capital (Bourdieu, 1986; Ziersch et al., 2005). As individuals engage in more socially productive activities, the relationships and bonds that they have with others will be strengthened, which could help them receive or perceive more support during the time of illness. This finding also extended Erikson (1968) theory into the context of chronic pain. Specifically, in Erikson (1968) theory, the central goal of midlife adults is contributing to the community and the next generation, and attaining this goal yields positive outcomes that may attenuate the adverse associations between chronic pain and individuals' well-being.

By attenuating the negative association between PI and PSS, the results also showed that SC at T2 also indirectly buffers the adverse association between PI at T1 and psychological wellbeing at T2, even when controlling for PWB at T1. Specifically, those with higher levels of SCs reported greater PWB at all levels of PI. It is important to revisit the point that it may be hard to determine the directionality among the constructs in this study. For instance, based on previous research, SC could also bolster PWB (Waytz & Hofmann, 2020), and it is possible that when people feel happier, they welcome more support from others (Proctor et al., 2009). When conducting the alternative model in post hoc analysis to test this possible direction, with PWB as a mediator and PSS as an outcome variable, the significant

results were not found. Hence, these findings are consistent with the self-determination theory (Ryan & Deci, 2001), suggesting that when the needs of relatedness are promoted, specifically through engaging in activities of SC (Weinstein & Ryan, 2010), PWB is consequently enhanced. Furthermore, these results are also consistent with the findings of Walen and Lachman (2000) and other longitudinal studies (e.g., Seeman et al., 1995), which indicated that social support more likely predicts well-being rather than well-being predicting social support. Another interesting finding from the post hoc analysis was that the moderated mediation results were no longer significant when switching SC from T2 to T1, though the directions of each pathway remained the same as in the original model. These findings suggest that the buffering effects of SC in the past might not be as significant in mitigating the adverse associations of chronic pain with social support and PWB in the present. Taken together, the findings provide insights into the importance of PSS and suggest the positive roles of SC, especially in the present, in promoting PWB of midlife and older adults in the face of chronic pain.

Limitations and Future Research Directions

The current study has some limitations that should be acknowledged. First, the use of a secondary dataset prevented the study from actively choosing the scale to measure our constructs. For instance, in the MIDUS dataset, PI is the only measurement that assesses chronic pain. Previous studies have shown that PI is a major indicator of pain severity (Miaskowski et al., 2019); however, relying solely on a single self-reported measurement of pain may limit researchers' ability to gather more comprehensive reports (McWilliams et al., 2004). Thus, future studies should use other valid scales to assess other domains of pain, such as pain severity, or by conducting a well-validated interview to gather more precise reports. Additionally, even though the current study utilized a large and nationally representative sample, over 90% of the participants identified as Caucasian. Thus, cross-cultural validity might be another limitation of this study. For instance, previous research has suggested that people who were raised in collectivist cultures might feel distressed and indebted for all the favors and help that they receive from others (e.g., Shen et al., 2011). Hence, social support might have different roles in the psychological and social well-being of people in other groups, and this potential cross-cultural difference could be explored in future research by examining this model in other ethnic and minority groups.

Finally, PI was measured at two time points, which were 10 years apart. Research indicates variability in the experience of chronic pain over time with reports of changes in the severity of pain, duration of pain, and location of pain in the body (Burri et al., 2018; Dezutter et al., 2015; Knook et al., 2012; Landmark et al., 2018). In addition, previous studies have found chronic pain to be characterized by periods of both fluctuating and stable courses, including phases of

recovery and re-onset (Kongsted et al., 2016; Landmark et al., 2018). Consequently, it is unknown whether PI at both of our time points were "singular events" or if they truly captured a continuous experience of PI across those years (Karlson et al., 2013, p.318). Even if participants were experiencing chronic pain for several years at both T1 and T2, it is uncertain as to whether the chronic pain was reflective of a single experience as pain could have occurred in an on-and-off pattern. Future studies can conduct follow-up measurements of PI throughout the interval periods to assess patterns of chronic pain experiences (e.g., pain location, pain intensity, and duration of pain).

Clinical Implications

The findings of the current study may be relevant for prevention efforts and interventions. The results indicated that even after controlling for the initial level of PWB, PI 10 years prior still had a significant adverse association with participants' current PWB. This suggests how chronic pain could longitudinally predict worse PWB of individuals over a decade. Hence, considering the longitudinal manifestation and history of pain could be beneficial in helping practitioners to gather more holistic and accurate information to multidimensionally assess chronic pain (Turk & Monrach, 2002). The scope and findings of the study are also consistent with the holistic approaches in treatment for chronic pain that not only focuses on reducing the physical symptoms but also promotes individuals' well-being and social support. Regarding promoting clients' social support, practitioners may introduce and refer clients to appropriate resources that could extend their social circles and promote social support, such as support groups, psychotherapy, or government programs. Furthermore, previous studies also suggested that involving family members and spouses in the treatment may reduce familial conflicts, foster positive interactions, as well as promote more social support for individuals with chronic pain (e.g., Hudgens, 1979; Leonard et al., 2006).

The current study also suggests the important roles of SC and prosocial engagement in promoting social support and PWB among midlife and older adults with chronic pain. When working with this population, practitioners can encourage clients to engage in prosocial activities in their daily lives that are appropriate for their physical conditions, such as helping with simple household chores, mentoring youth, or volunteering. These activities may help individuals with chronic pain realize that their conditions do not completely prevent them from being productive and significant members of their communities. More importantly, the current study also suggests that SC in the past may not be as important as the contributions that individuals make in the present. Thus, focusing on what clients could currently do to contribute to the welfare of others may be a more empowering and effective approach to promote clients' sense of meaning and significance.

Overall, the current study contributes to the literature of pain, aging, and health psychology in at least four important ways. First, this is the first study that utilized a complex moderated mediation to examine the roles of PSS and SC in the PWB among midlife and older adults with chronic pain. Second, the study's longitudinal design also helps to reduce the interpretational problems that are usually associated with cross-sectional mediation analysis (Maxwell & Cole, 2007). Moreover, the study also controlled for the stability effect, which is a gold standard of longitudinal research (Adachi & Willoughby, 2015). Even though doing so would significantly reduce the effect size of the findings, we believe that the benefits would outweigh this limitation as it allows us to examine whether the protective role of SC and the changes in PWB are longitudinally meaningful. Third, the use of the nationally representative dataset of MIDUS enables us to generalize the findings to a large and community-based population. Last, the current study contributes to the efforts of examining the PWB and social outcomes among midlife and older adults with chronic pain (Dueñas et al., 2016). By focusing on strength-based concepts, such as SC and PWB, our approach moves away from the deficit-based orientation that has dominated the pain literature to examine and unveil factors that could make people's lives worthwhile and thriving even in the face of chronic pain.

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