

# Emotion regulation through music and mindfulness are associated with positive solitude differently at the second half of life

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## Abstract

Mindfulness and emotion regulation through music listening are skills that share some attributes with the skill of positive solitude (PS; defined as an inner choice to dedicate time to a meaningful, enjoyable activity or experience managed by oneself, with or without the presence of others). Nevertheless, little is known about their relationship with PS in the second half of life. Hence, we recruited a convenience sample of community-dwelling adults in the second half of life ( $N = 123$ ;  $M = 68.63$ ,  $SD = 10.99$ ), who completed self-report measures of demographics, emotion regulation through music, mindfulness, and PS. A hierarchical linear regression demonstrated significant positive associations between emotion regulation through music listening and PS, and between mindfulness and PS. Moreover, age moderated the relationship between mindfulness and PS. This relationship was found to be positive and significant only among older adults. These findings support the study's hypotheses and emphasize the contribution of the current research to developmental research on PS in the second half of life.

## Keywords

Emotion regulation through music listening, PS, loneliness, mindfulness, second half of life

## Introduction

During the second half of life, people may spend a substantial portion of their time in solitude (Larson, 1990; Pauly et al., 2017). While solitude may, at times, be experienced as loneliness, it may also create an opportunity for positive personal experiences (Ost Mor et al., 2020; Palgi et al., 2021). Such an opportunity was delineated by the term “positive solitude” (PS), defined as an inner choice to dedicate a given time to a meaningful, enjoyable activity or experience (e.g., a spiritual, functional, recreational or instrumental activity), which is managed by oneself, with or without the presence of others (Ost Mor et al., 2020).

While the capacity to be alone is a developmental achievement occurring early in life (Winnicott, 1958), PS is a skill that (a) can be acquired at any age, (b) can be enhanced by other activities and skills, and (c) is positively related to mental well-being (Larson, 1990; McCarthy & Bockweg, 2013). Moreover, we suggest that PS is a distinctive developmental skill that can be cultivated along the life course. Hence, the purpose of the current study was to examine whether the skill for PS is associated with other personal skills, which are related to cognitive and emotional experiences, namely, to emotion regulation through music listening and mindfulness. Both skills can be used by people throughout the life course and are often associated with pleasant experiences (Long & Averill, 2003; Sloboda, 1999). In addition,

both skills can take place when people are by themselves, share similar attributes with PS (spirituality, creativity, and a sense of autonomy), and require elementary mental resources or physical abilities (Brown & Ryan, 2003; Henderson et al., 2013; Palgi et al., 2017; Saarikallio, 2011).

## PS

PS's skill has several particular characteristics. At its core lies the ability to choose, which is based on a sense of autonomy, mastery, and competency—three attributes which can fluctuate over the life course (Larson, 1990; Thomas & Azmitia, 2019). In addition, since it is based on free will / freedom of choice, people can choose to engage in volitional PS experiences, even under debilitating circumstances (like reframing an inconvenient situation by listening to an interesting podcast while being “forced” to use one's “free time” to wait for a doctor's appointment).

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The capability of PS differs from the experience of loneliness and social isolation. *Loneliness* is defined by the gap between desirable and actual social interactions (De Jong-Gierveld, 1998), while *social isolation* is defined as the absence of actual social interactions (Detrixhe et al., 2014). Even though loneliness and social isolation can lead to health problems such as heart disease, anxiety, depression, and cognitive decline (Hughes et al., 2004), PS is associated with a wide range of potential benefits that may significantly improve peoples' mental, psychological, and physical well-being (Palgi et al., 2021; Thomas & Azmitia, 2019). According to Burger (1995), PS provides new opportunities for problem-solving, creative decision-making, foreseeing and effective adjustments to future times, and for contemplation and intellectual achievement. Other researchers suggest that PS increases self-esteem and self-creation, emotional renewal, and relaxation (Ost Mor et al., 2020; Palgi et al., 2021; Thomas & Azmitia, 2019).

PS is manifested by various activities (routines, or meaningful, creative activities and hobbies) and is performed outdoors in quiet places in nature (parks, the beach, etc.) (Long & Averill, 2003). Nevertheless, in practice, the skill of PS mostly takes place at home (Long & Averill, 2003). In addition, some aspects of this skill may continue to develop in old age (Larson, 1990; Long et al., 2003) and assist in improving the individual's sense of autonomy (Larson, 1990; Pauly et al., 2017). PS is also enhanced by emotional sensations of pleasantness, serenity, and relaxation (Ost Mor et al., 2020), which involve emotion regulation processes (Nguyen et al., 2018). Given the adverse possible implications of a time alone experience (such as sadness and loneliness; Chui et al., 2014), the significance of these emotion regulation processes for the aptitude for PS is emphasized.

## Emotion Regulation

*Emotion regulation* is defined as a multi-dimensional system of automatic or controlled processes, involved in the initiation, maintenance, and change of occurrences, intensities, and durations of emotional states (Webb et al., 2012; Weinberg & Klonsky, 2009). It includes physiological regulation processes and behavioral expressions related to emotions (Gross, 1998), as well as mood regulation processes, which enable longer periods of changes in affect (Saarikallio, 2011).

Several developmental gains in emotion regulation were reported in midlife and late adulthood (Carstensen & DeLiema, 2018; Carstensen et al., 2011; Isaacowitz & Harris, 2014). According to Carstensen's socio-emotional selectivity theory (SST; Carstensen & DeLiema, 2018; Carstensen et al., 2003), as people become older, the shortening of future horizons motivates them to allocate more resources to emotion regulation in the present, and they prefer to focus on meaningful emotional experiences rather than on cognitive aspects (Reed & Carstensen, 2012). Recent studies (Carstensen & DeLiema, 2018) suggest that this phenomenon emerges from middle age onward. In this study, we focus on circumstances in which individuals find themselves in solitude under various circumstances. We suggest that the mechanism of emotion regulation is associated with the ability to improve the experience of solitude (Long et al., 2003). For example, when reality deprives people of social relationships (e.g., due to the death of close family members, or because

of retirement from work), they can use their ability to regulate emotions through music or to engage in mindfulness to seek out situations in solitude that result in positive emotional experiences. In fact, due to the shortening of the future time perspective which begins in middle age, people are less motivated to pursue instrumental goals. Therefore, alongside social compensations they may improve the quality of their "alone" time by concentrating on their internal positive experiences.

Another key model that provides a general theoretical framework for understanding emotion regulation processes over the life span is the SOC-ER model, which attempts to explain the structure of emotion regulation mechanisms by relating the selection, optimization, and compensation mechanisms (SOC model; Baltes & Baltes, 1990) to the emotion regulation model (SOC-ER; Urry & Gross, 2010). Following the SOC-ER model, we suggest that when older adults are by themselves, they may use the "situation selection" (elective selection) of emotion regulation strategy to devote their attention to activities such as mindfulness and music listening. By selecting such strategies, they can effectively utilize mental and physical resources (Brown & Ryan, 2003; Long et al., 2003; Palgi et al., 2017; Saarikallio, 2011) that may help them achieve a positive benefits when they are by themselves (Lay et al., 2020; Thomas & Azmitia, 2019).

Moreover, Charles' (2010) strength and vulnerability integration model (SAVI) describes two mechanisms of emotion regulation that occur in middle and late adulthood (Knepple Carney et al., 2021): clinging to positive emotions; and avoiding unnecessary stressful situations, which yield negative emotions. Hence, we suggest that the selection component mentioned earlier can be manifested by the inner processes of searching for directed activities that enable positive experiences, by reframing situations in which people are by themselves as positive, and by avoiding negative situations of this type.

In sum, based on this literature and following Nguyen et al. (2018), we suggest that during the second half of life emotion regulation mechanisms may enhance PS which, in turn, enables one to more easily bear intense emotions and to experience them without seeking approval, reassurance, encouragement, and assistance from others (Long & Averill, 2003). Thus, in the current study we present an initial examination of the association between a specific form of emotion regulation through music and PS during the second half of life.

## Emotion Regulation Through Music Listening

Changes and improvements in emotion regulation can result from solitary music listening (Larson, 1990; Saarikallio, 2012; Sloboda, 1991). The ability of music to regulate emotions and mood, and to serve as a means of stress reduction in daily life even without the presence of others, has been emphasized as the main reason for listening to music (Greasley & Lamont, 2011; Sloboda, 1991). Seven basic strategies of emotion regulation through music listening were described across the life span (Saarikallio, 2011). These strategies support the improvement of various measures of mood, by mobilizing the emotion regulation system (Gross, 1999). The seven strategies manage to change a bad mood, raise energy levels, and reduce tension, and are particularly relevant to individuals in their second half of life. Music

listening in older adults was found to increase their sense of pleasure, strengthen their positive emotions, allow them to reflect on their emotional processes, emphasize their personal choices, and strengthen their identity (Greasley & Lamont, 2011; Laukka, 2007; Sloboda, 1999). In the context of PS, music listening was described as an activity that provides a means by which to cope with the psychosocial challenges associated with aging, such as adjusting to solitude, facing the loss of loved ones, and maintaining experiences of agency and interest in life (Ost Mor et al., 2020; Palgi et al., 2021; Saarikallio, 2011). Hence, we suggest that emotion regulation through music listening shares similar attributes with PS, such as autonomy, selection, spirituality, and creativity. Furthermore, we propose that mindfulness, as one of the spiritual activities people tend to use when they are experiencing episodes of solitude (Long et al., 2003), shares these common attributes of concentrating on internal mental resources which alleviate stress and regulate mood changes (Brown & Ryan, 2003; Davis & Hayes, 2011).

### Mindfulness

*Mindfulness* refers to the awareness that emerges by purposely and non-judgmentally paying attention to the unfolding experience of the present moment (Kabat-Zinn, 2003; Shapiro et al., 2006). Many philosophical, spiritual, and psychological traditions emphasize the importance of being mindful for the individual's mental and physical well-being (Fountain-Zaragoza & Prakash, 2017; Kabat-Zinn, 2003). Moreover, meta-analyses have suggested that mindfulness training promotes a wide range of physiological and mental benefits (Li & Bressington, 2019). These benefits include the reduction of depression and anxiety symptoms; the mitigation of ruminative thoughts; and an optimization of emotion regulation mechanisms (Davis & Hayes, 2011; Khoury et al., 2013). However, unlike the strategy of emotion regulation through music listening, the main strategy of mindfulness, which enables beneficial emotion regulation processes, has been described as focusing one's attention on the "here and now" (Chambers et al., 2009).

Although few studies have focused exclusively on the effect of mindfulness on older people, in recent years more studies indicate the benefits of mindfulness meditation during the second half of life, and report it helps to optimize physical and mental health by reducing distress and by promoting well-being (Foulk et al., 2014; Li & Bressington, 2019). Furthermore, present-moment attention and nonjudgment were found to be positively associated with age, suggesting that these qualities may naturally develop with increased life experience (Mahlo & Windsor, 2021). Finally, PS was also found to be positively associated with attentiveness to the present moment (Leavitt et al., 2021; Palgi et al., 2021).

### The Current Study

The present study aimed to deepen the existing knowledge regarding the associations linking emotion regulation through music listening and mindfulness with the skill of PS in the second half of life. Mindfulness and emotion regulation through music are both related and may improve PS. Since emotion regulation through music listening, mindfulness, and PS seem to change with age (Larson, 1990; Mahlo & Windsor, 2021; Saarikallio,

2011), we hypothesized that age moderates the links between each of these skills and PS.

Therefore, we hypothesized that (H1 and H2) participants with a higher ability to regulate emotion through music or engage in mindfulness will demonstrate a higher level of PS; (H3) chronological age will moderate the connection between the ability to regulate emotion through music and PS. (H4) chronological age will moderate the connection between mindfulness and PS. Since there is no literature regarding the relationships between the variables examined in Hypotheses 3 and 4, the directions of the moderations were tentatively tested, and these hypotheses are framed as exploratory questions.

## Method

### Participants and Procedure

This study used data from a convenience sample that was collected as part of a seminar course for graduate students in the department of music at Bar-Ilan University. The students approached 123 Jewish community-dwelling adults, who volunteered to complete a Qualtrics web-based platform (out of 214 participants who visited the URL and started the survey, 144 completed it; 21 participants, who were under the age of 50, were removed from this database). Inclusion criteria were (1) fluency in Hebrew and (2) no medical diagnosis of any cognitive impairment, as reported by the participants to the students. Data were collected during 2018–2019. The participants' mean age was 68.63 ( $SD=10.99$ , range=50–90), half of them were women (51.2%), and most of them were married (74%) and had an academic education ( $M=14.94$ ,  $SD=3.37$ ). Most of the participants (85%) rated their health as "quite good and above" ( $M=3.60$ ,  $SD=1.09$ ). In addition, slightly less than half reported playing a musical instrument (44%) and over half (60.2%) reported being exposed to at least 1 hr of music each day. All the participants provided an informed consent form, and their anonymity was maintained. The study received ethical approval on 28 March 2018 by a departmental ethical review board (IRB) from Bar-Ilan university.

### Measures

*Socio-demographic characteristics questionnaire:* These included age, gender (categorized into 0=male, 1=female), marital status (categorized into 0=single, divorced or widow; 1=married or cohabiting), education (years of formal education), self-rated health (one item, categorized into 0=not good at all, 1=not so good, 2=good, and 3=excellent, see Benyamini et al., 2000), playing an instrument (categorized into 0=no, 1=yes), and number of hours of exposure to music per day (less than an hour, 1–3 hr, and more than 3 hr).

*Emotion regulation through music listening* was measured by a translated version (adapted from Shiffriss et al., 2015) of the Brief Music in Mood Regulation (BMMR) scale (Saarikallio, 2012); a 21-item self-report scale which includes statements such as "Music helps me to understand different feelings in myself." The scale includes seven strategies of emotion regulation through music (entertainment, revival, strong sensation, diversion, discharge, mental work, and solace). An overall score is obtained by averaging the 21 items (Saarikallio, 2012). A higher score reflects

**Table 1.** Descriptive Statistics and Correlations of the Study Variables (N= 123).

	N	Min	Max	M/%	SD	1	2	3	4	5	6	7	8
Music in mood regulation	119	1	5	2.99	.78	1							
Mindfulness	114	15	87	58.96	12.21	.38***	1						
Age	123	50	90	68.63	10.99	-.18**	-.01	1					
Gender	123	—	—	51.2%	—	-.06	.13	.08	1				
Playing an instrument	123	—	—	44.0%	—	.25**	.12	-.15	-.08	1			
Exposure to music <sup>a</sup>	123	1	3	1.70	.64	.49***	.30***	-.001	.15	.16	1		
Positive solitude	122	1	5	3.66	.68	.56***	.52***	-.30***	.11	.14	.29***	1	
Education	123	6	25	14.94	3.32	.23**	.23**	-.05	-.14	.33***	.96	.26***	1

Note. <sup>a</sup>Hours per day.  
 \*\**p* < .01. \*\*\**p* < .001.

a higher ability for emotion regulation through music (Saarikallio, 2012). The internal reliability of the total index in the current study was high ( $\alpha = .96$ ).

The skill of PS was measured using the PS questionnaire (Palgi et al., 2021). This questionnaire was designed following procedures which conceptualized the theoretical basis of the concept of PS. It includes nine items which assess the extent by which people volitionally prefer experiences of being by themselves, and which they perceive as beneficial. For example, “Time with myself encourages my creativity.” Participants were asked to rate the items using a 5-point Likert-type scale, ranging from 1 = *strongly disagree* to 5 = *completely agree*. The questionnaire score is computed by a mean score of all items, with a higher score reflecting a higher ability for PS. The reliability among the items found in the present sample, as calculated by the Cronbach’s alpha index, was high ( $\alpha = .89$ ).

Mindfulness was measured using the translated Hebrew version (Bernstein et al., 2011) of the Mindful, Attention, Awareness Scale (MAAS; Brown & Ryan, 2003). This 15-item questionnaire measures the frequency of mindfulness situations over time, by questioning the individual’s attention and awareness of present experiences. It includes items such as: “It seems I am ‘running on automatic pilot’ without much awareness of what I’m doing.” Participants were asked to rate how often they experience the situation described in each item on a scale ranging from 1 = *almost never* to 6 = *almost always*. The score is calculated by the sum of all items, with higher scores signifying a higher ability to engage in mindfulness. The internal reliability found in the present study was high ( $\alpha = .91$ ).

**Data Analysis**

To test the study hypotheses, we performed statistical analyses using SPSS software version 25, with significant interaction probed by Model 1 of simple moderation, using the PROCESS 3.4 macro for SPSS (Hayes, 2018). Descriptive statistics and initial correlations of the study variables were computed.

The study hypotheses were examined through a hierarchical linear regression. To test Hypotheses 1 and 2, demographics and covariates (gender, years of education, playing an instrument, and number of hours of exposure to music per day) were entered in the first step.<sup>1</sup> Furthermore, since musicians have a better capability for emotional regulation than non-musicians (Park et al., 2014), playing an instrument and number of hours of exposure to music per day were controlled for as well, which is

common in studies involving music listening (see, e.g., Shiffriss et al., 2015). In the second step, chronological age, emotion regulation through music listening, and mindfulness were entered. Finally, in the third step, the interactions between Chronological Age × Emotion Regulation Through Music Listening on PS and Chronological Age × Mindfulness on PS were calculated. Continuous predictors were mean-centered before analyses. To rule out potential multicollinearity, a preliminary analysis was also performed. This analysis showed a tolerance rate ranging from .67 to .98 and a variance inflation factor (VIF) of 1.05–1.50 for the Age × Mindfulness interaction; and a tolerance rate ranging from .69 to .96 and a VIF of 1.05–1.50 for the Age × Emotion Regulation Through Music Listening interaction. These results indicate no multicollinearity problem (O’Brien, 2007).

**Results**

Table 1 presents the descriptive statistics for the study variables. As can be seen, significant and positive moderately high correlations were found between MMR (Music in Mood Regulation) and PS ( $r = .56; p < .001$ ), and between mindfulness and PS ( $r = .52; p < .001$ ). In addition, there was a significant positive, and moderate-high correlation between time of exposure to music per day and the ability for MMR ( $r = .49; p < .001$ ), a significant positive, moderate-low correlation between MMR and playing an instrument ( $r = .25; p < .01$ ) and between education and PS ( $r = .26; p < .001$ ), and a negative-moderate correlation between age and PS ( $r = -.30; p < .001$ ) (see Table 1).

Next, to test the study hypotheses, we conducted a hierarchical regression analysis (see Table 2). As seen in the table and in line with the first and second hypotheses, after controlling for demographics and covariates in Step 1, in the second step, those with a higher ability for emotion regulation through music reported higher PS skills ( $\beta = .34, p < .001$ ). Moreover, those with higher mindfulness skills reported higher PS skills ( $\beta = .35, p < .001$ ), and older adults reported lower PS skills ( $\beta = -.27, p < .001$ ). The main effects in the second step explained an additional 16% percent ( $\Delta R^2 = .341, p < .001$ ) of the variance in PS. Step 3 explained an additional 4% ( $\Delta R^2 = .04, p < .001$ ) of the variance in PS—although in discordance with Hypothesis 3, the interaction between MMR and age was not significant ( $\beta = .06, p = .47$ ). In line with the fourth hypothesis, the interaction between age and mindfulness was significant ( $\beta = .22, p < .01$ ). To probe the interaction, PROCESS 3.4 macro software was used (Hayes, 2018). Figure 1 presents the two-way interaction between

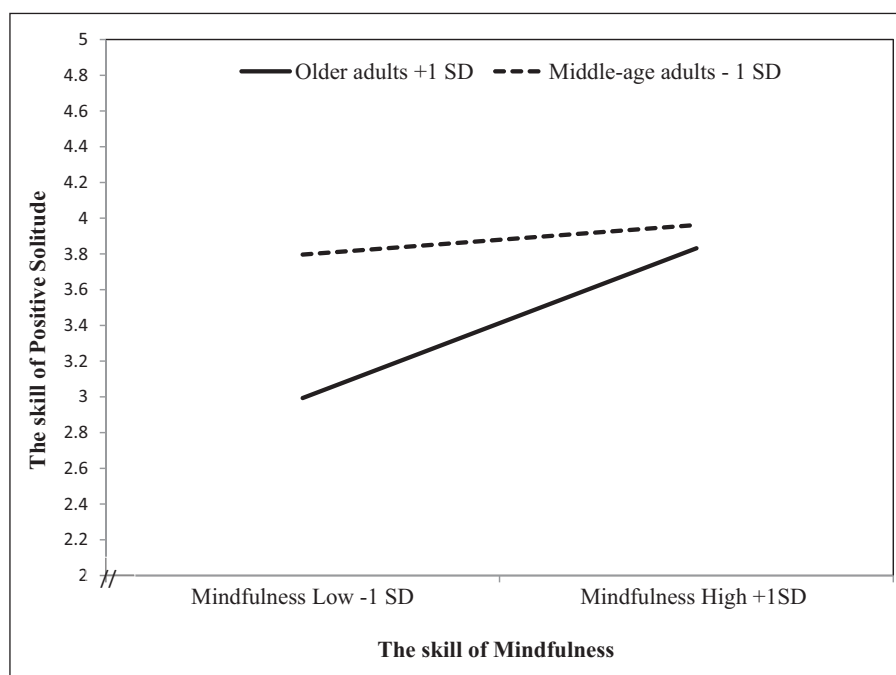
**Table 2.** Linear Regression Analysis Examining the Relationship Between the Predictive Variables and the Skill of Positive Solitude.

Model variables	B	SE	$\beta$	95% CI		F	R <sup>2</sup>	R <sup>2</sup> $\Delta$
				LL	UL			
Step 1						5.73***	.174***	.174
Gender	.10	.12	.07	-.14	.33			
Education	.05	.02	.26	.02	.10			
Playing an instrument	-.14	.12	-.10	-.38	.11			
Exposure to music <sup>a</sup>	.24	.10	.24	.06	.43			
Step 2						16.05***	.52***	.341
Music in mood regulation	.29	.07	.34***	.15	.43			
Age	-.02	.004	-.27***	-.03	-.01			
Mindfulness	.02	.004	.35***	.01	.03			
Step 3						14.40***	.56***	.040
Music in Mood Regulation $\times$ Age	.004	.01	.06	-.01	.02			
Mindfulness $\times$ Age	.001	.000	.22**	.000	.002			

Note. CI: confidence interval; LL: lower limit; UL: upper limit. N = 114.

<sup>a</sup>Hours per day.

\*\* $p < .01$ . \*\*\* $p < .001$ .



**Figure 1.** The Association Between Mindfulness and the skill of Positive Solitude Is Moderated by Chronological Age (N = 114).

chronological age and mindfulness on PS. As can be seen, for middle-aged adults ( $-1SD$ ), the relationship between mindfulness and PS is not significant ( $\beta = .13, p > .05$ ), while for older adults ( $+1SD$ ) the relationship between mindfulness and PS was positive and significant ( $\beta = .58, p < .001$ ). Using Jonson Neyman's technique, it was revealed that the significance region is above the age of 61 ( $\beta = .21; p = .05$ ).

## Discussion

In this study, we examined two skills along the second half of life, which share some attributes with the skill of PS: *emotion*

*regulation through music and mindfulness*. The study findings supported most of the proposed hypotheses. In line with H1, we found a high positive association between emotion regulation through music and PS. This finding corresponds with previous studies (Greasley & Lamont, 2011; Laukka, 2007; Saarikallio, 2008, 2011, 2012) showing that in the second half of life, emotion regulation through music listening contributes to the individual's mental and psychological well-being. Furthermore, given that the current study focuses solely on positive phenomena (without contrasting them with negative ones), it can be speculated that this finding is consistent with the *positivity effect*, which refers to a relative preference that emerges

in middle and late adulthood in the individual's attention and memory for positive information over negative one (Carstensen et al., 2003; Parks & Clancy Dollinger, 2014). To examine this speculation, future longitudinal studies can examine whether PS moderates the positive and negative associations between age and positive and negative emotions, respectively.

In line with H2, our findings demonstrate a positive association between mindfulness and PS. These findings correspond with our assumption that mindfulness shares common attributes with PS (Long et al., 2003) and are consistent with previous studies that examined intentional solitude practiced through mindfulness (Leavitt et al., 2021).

Chronological age was not found to moderate the association between emotion regulation through music listening and PS, and therefore hypothesis H3 was not supported. This might be due to the measurement tool which was used in the current study to examine emotion regulation through music listening (BMMR; Saarikallio, 2012) and was solely examined on adolescents and adults, but not on older adults. In addition, the negative correlation between chronological age and PS may reflect the fact that there is a difference between the potential benefits of employing PS skills by older adults (Larson, 1990) and their actual dependence on others which results from the deterioration in their mobility, in their senses, in their cognition, and in their health. In fact, we see this finding as emphasizing the significance of honing this skill especially among older adults who spend a substantial amount of their time alone. Re-examining these findings through longitudinal studies might be an important direction for future research.

Consistent with H4, age moderated the relationship between mindfulness and PS. While the findings showed that middle-aged adults have higher PS skills, older adults seem to have a better aptitude for PS only when they also demonstrate a higher level of mindfulness. These findings also strengthen our understanding regarding the role of age in achieving PS. While in midlife the skill of PS increases, older adults with better inner resources, such as the ability to engage in mindfulness, can achieve PS skills on par with that of middle-aged people. Furthermore, the moderation of age in the relationship between mindfulness and PS may support the shift from a wide future perspective to goals which are associated with positive present-moment experiences (Reed & Carstensen, 2012).

### Limitations

Several study limitations should be noted. First, the sample is a convenience sample, and its findings do not necessarily represent the general population. Second, the cross-sectional design impedes the ability to examine causality between the variables. Furthermore, some of the important measures, like playing music and music consumption, were examined in a rather superficial manner (by single items). Finally, the research was based on self-report questionnaires, which are subjected to social desirability.

### Conclusions

This research provides the first traces of evidence for the relevance of emotion regulation through music listening and mindfulness skills in the context of the skills of PS in the second half of life, and initial insights regarding their relationship with PS

skills. The study findings also confirm that, in the second half of life, PS skill is associated with the skills of emotion regulation through music listening and mindfulness. Thus, the study contributes to the growing body of literature on PS skills and the ways they can be enhanced in the second half of life. These findings can pave the way for deepening our theoretical understanding of it, and for therapeutic interventions that can be used for its improvement in late life.

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### Note

1. Previous studies examining solitude and the relationship between personality traits such as introversion, and sociability skills like loneliness (Burger, 1995; Coplan et al., 2019), provided a complex and inconsistent picture (Coplan et al., 2019). To rule out their potential bias effects, we additionally tested the data while controlling for those traits and found that it did not affect the findings.

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