

Communal music as a tool to improve positive affect after social ostracism or negative autobiographical memory recollection

Mayron Piccolo

mpiccolo@fas.harvard.edu

Harvard University

Deborah Wanderley dos Santos

Harvard Graduate School of Education

Shaun Herold

Harvard Extension School

Jill Hooley

Harvard University

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Abstract

Exposure to communal music may help regulate mood and cultivate feelings of belonging. Across two studies, we tested whether exposure to communally experienced (communal) music could impact participants' affect following social ostracism and negative mood induction. Participants were exposed to a social media ostracism paradigm (SMOP; $n = 106$) or an autobiographical negative memory recollection task (ANMIT; $n = 116$), followed by a communal or a control song. Participants exposed to the communal song showed improved positive affect in both studies ($p_{\text{study 1}} = 0.004$; $p_{\text{study 2}} = 0.022$), whereas affect worsened for those exposed to the control songs. Additionally, participants in the communal condition reported a greater sense of belonging associated with the music compared to the control ($p = 0.026$). These findings suggest that communal music may improve affect—improving positive affect by strengthening social connectedness—even when listened to in isolation.

Introduction

Feelings of non-belonging, or ambiguity about whether or not one belongs, pervade individuals' experiences of work, their local communities, and their country [1]. Among a United States sample including 4,797 respondents, fewer than 36% of people expressed a firm sense of belonging across different social contexts. In addition, 17% of individuals in the same study experienced a sense of non-belonging, or ambiguity about belonging in *every* domain of their life, including with family and friends. These statistics are especially concerning since feelings of social connectedness may be protective factors against anxiety and depression [2]. Communal music-based interventions may be uniquely poised to increase feelings of belongingness and to improve affect in times of exclusion and distress.

Mental-health-related music interventions are remarkably versatile and have shown positive benefits in a variety of clinical and non-clinical settings [3]. *Participatory music* (i.e., active involvement in music creation and performance, encompassing activities such as singing and playing instruments), for instance, is known to improve quality of life [4, 5], perceived social support, self-esteem, and self-confidence [4, 6, 7] (see Dingle, Sharman [8] for a comprehensive review). On the other hand, *receptive* music listening, which is a more passive activity that often does not involve the participant choosing what to listen to [8], is commonly employed in healthcare and other settings. Receptive music listening has shown promising results in promoting overall well-being through mechanisms such as pain relief and anxiety reduction [9]. Furthermore, *intentional* music listening studies, characterized by protocols involving participants in the choice of repertoire, have also shown positive results, including improved mood [10, 11].

Multicultural studies point to the use of music for similar goals and with similar effects, across different countries. For instance, Feneberg, Stijovic [12] showed, in a cohort study of 711 adults in Austria and Italy, that music listening significantly reduced stress and improved mood, with heightened effects for individuals with chronic stress. Additionally, in a survey spanning 11 countries ($n = 5,619$), Granot, Spitz [13] found that music (among activities such as information seeking, entertainment using movies,

games, or series, physical activities, etc.) was the most effective activity for enjoyment, venting negative emotions, and fostering self-connection. Notably, it was second only to socialization for creating togetherness. These findings were consistent across genders and countries, with minor age variations as well as a notable impact of music's personal importance.

Music-based interventions are inherently complex, encompassing an array of variables that likely interact to produce the observed benefits. For example, researchers may consider musical arrangement (style, tempo, melody, instrumentation, harmony), music attributes (genre, complexity, thematic elements), modes of engagement (singing, listening, playing, composing), and previous music exposure (relevance, familiarity, preferences) when evaluating the impact of music on mental health or wellbeing [14]. The interplay between music characteristics and individual traits (cultural background, age, gender) as well as the context in which music is applied (clinical, community, home-based, or self- or therapist-guided) is also expected to significantly influence the outcomes.

Most studies investigating the connection between *individually* targeted music listening and affective states have investigated music *familiarity*, *nostalgia*, and *preference* [3, 15–19]. For example, exposure to *long-known music* (20 + years) was associated with improved memory markers in individuals with early-stage cognitive decline [18], subsequently contributing to enhanced measures of well-being. Along the same lines, exposure to music that evokes nostalgia, i.e., “a self-relevant emotion, incorporating personal, meaningful, and mostly positive autobiographical memories [20], p. 2046–2047], has also led to interesting findings. In a recent review, Sedikides, Leunissen [20] highlight several psychological benefits of nostalgia-evoking music, including, but not limited, to an increased sense of connectedness and belonging. Interestingly, these findings remain even in the absence of music (i.e., with lyrics alone) [21]. Similarly, preferred music was found to differentially activate the ventral striatum [15], a region associated with reward processing and implicated in various mental disorders [22]. Finally, listening to music relevant to oneself, i.e., chosen by the individual, differentially modulates pain responses and anxiety [23, 24]. In short, the effectiveness of music-based interventions is significantly influenced by various music characteristics and the interplay between these attributes and individual traits, engagement modes, and context. Unfortunately, the *social* context where music is experienced has been largely neglected or overlooked as a variable in many psychological studies.

Music-based interventions demonstrate significant potential across social contexts, spanning family, peer, educational, and workplace settings. Boer and Abubakar [25] investigated how music experienced in families and among peers contributes to social cohesion and emotional well-being of younger individuals. Drawing on data from 760 participants across Kenya, the Philippines, New Zealand, and Germany, the findings revealed that music listening strengthens family cohesion and peer group bonds, with peer group music generally linked to well-being. However, these experiences were particularly impactful for emotional well-being in traditional/collectivistic cultures. Additionally, family music consistently fostered cohesion across all stages, while peer group rituals' effects varied depending on cultural and developmental contexts. Although interesting, the study's cross-sectional design, coupled

with the fact that participants were not exposed to the music they reported on, limit the generalizability of its findings.

Studying the effect of music and its association with the context in which it is experienced is important because previous research suggests that music listening can serve as a substitute for the social environment in which it occurs [26]. Schäfer and Eerola [26] argue that this sense of connection may arise through memory recall or identification processes, functioning as a type of *social surrogate*. For instance, in a small qualitative study with elderly individuals ($n = 14$), Groarke, MacCormac [27] identified that listening to music reminded participants of communal settings where the song had been previously experienced. The songs were intentionally chosen by the participants to induce positive affect and potentially functioned as a social surrogate during the COVID-19 pandemic quarantine. These findings are promising and point to the need to further explore the role communal music (i.e., music experienced by most people in a given context) plays in fostering wellbeing. Within the existing body of literature, the terms "communal" and "community" are often used interchangeably to describe artistic initiatives aimed at nurturing social engagement and inclusivity within group contexts. As a differentiation between these terms may be lacking within music psychology studies, we propose a distinction: communal music here emphasizes music that is experienced within a group or community with shared identity (e.g., listening to one's national anthem in a stadium), contributing to an increase in sense of belonging, whereas community music serves as a broader term encompassing a wide range of musical activities and programs in general group settings (e.g., listening to a foreign national anthem in a stadium). In other words, for communal music to be experienced, the individual must have a sense of affiliation to the community in which that music experience happened.

Taken together, the findings reported above build on the well-established phenomenon that music listening can enhance well-being and suggest that fostering a sense of belonging may be a mechanism by which it occurs, even when the music is experienced in isolation. In the present study, we investigated whether individual exposure to communal music versus neutral or non-communal positive affect music specifically serves as an affect regulator—either by enhancing levels of positive affect or mitigating increases in negative affect and state anxiety during times of social exclusion or personal distress. We hypothesized that individuals exposed to a communal music stimulus following exposure to a social media ostracism paradigm (SMOP; Study 1) or an autobiographical negative mood induction task (ANMIT; Study 2) would experience a less marked decline in general affect (positive affect, an improvement in their negative affect, and decreased state anxiety) compared to individuals exposed to a control (i.e., neutral or non-communal positive affect) music stimulus. We further hypothesized that feelings of belonging or connectedness (more than positive affect related to the song) would be higher in those exposed to communal versus control music. Finally, we explored the role of familiarity, music affect, and nostalgia in improving affect.

Materials and methods

Study 1

Participant recruitment and song selection

To select the communal music stimulus, we first recruited a sample of participants from the United States who reported watching sports in general and baseball in particular (phase 1). These participants were recruited using Prolific. Participants were asked 1) if they had ever seen a baseball game in a stadium, 2) what the home team was, 3) how much (on a 0–10 scale) they considered themselves to be a fan of that team, and 4) if any particular song came to mind when they thought about being at the stadium, and if so, what that song was. Responses were only considered for those participants who reported having seen a game at the stadium ($n = 270$). The song “Take Me Out to the Ballgame” was mentioned by more than 40% of the participants. Accordingly, this song was chosen as the communal music for the experimental group. Details on the participants’ demographics and songs are provided in Table S1.

Individuals who reported having attended a live baseball game in a stadium were subsequently invited to participate in the second phase of Study 1, which was presented to them as an independent project. We restricted participation to this sample to ensure that these participants had been exposed to “Take Me Out to the Ballgame” in a communal setting. The final sample consisted of 106 participants (see Table 1 for further details). The sample size was determined by the available funding for this pilot test.

Table 1
Study 1, phase 2 participants' demographics

	Communal (N = 51)	Control (N = 55)	Omnibus Test
Age (years)			
Mean (SD)	45.2 (14.5)	42.8 (11.8)	W = 1441
Median [Min, Max]	41.5 [23.0, 73.0]	39.0 [28.0, 74.0]	$p = 0.445$
Missing	1 (2.0%)	2 (3.6%)	
Sex			
Female	20 (39.2%)	12 (21.8%)	$p = 0.059$
Male	31 (60.8%)	43 (78.2%)	
Latino/Hispanic			
No	48 (94.1%)	48 (87.3%)	$p = 0.323$
Yes	3 (5.9%)	7 (12.7%)	
Ethnicity			
Asian	4 (7.8%)	3 (5.5%)	$p = 0.848$
Black	2 (3.9%)	3 (5.5%)	
Mixed	3 (5.9%)	1 (1.8%)	
Other	1 (2.0%)	1 (1.8%)	
White	41 (80.4%)	47 (85.5%)	
Employment status			
Full-Time	34 (66.7%)	39 (70.9%)	$p = 0.948$
Not in paid work (e.g. homemaker', 'retired or disabled)	1 (2.0%)	2 (3.6%)	
Other	1 (2.0%)	0 (0%)	
Part-Time	6 (11.8%)	6 (10.9%)	
Unemployed (and job seeking)	0 (0%)	1 (1.8%)	
Missing	9 (17.6%)	7 (12.7%)	
Musical training (years)			

	Communal (N = 51)	Control (N = 55)	Omnibus Test
Age (years)			
Mean (SD)	0.980 (1.53)	1.22 (1.62)	$p = 0.345$
Median [Min, Max]	0 [0, 4.00]	0 [0, 4.00]	

Cultural Contexts of Experimental and Control Songs

Both songs used in Study 1, "Take Me Out to the Ball Game" and "Guggisberglied," can be regarded as forms of communal music. They are often employed in contexts that unite people through shared singing, cultural traditions, and unifying themes, potentially fostering a sense of community and shared identity among participants in the musical experience. The "Take Me Out to the Ball Game," composed by Jack Norworth and Albert Von Tilzer in 1908, has become an unofficial anthem of North American baseball, with its chorus traditionally sung collectively by fans during the seventh inning stretch, enhancing the communal atmosphere and highlighting the common experience of attending a baseball game. The Library of Congress recognizes the enduring impact of the song on American musical culture and often considers it a part of Americana [28]. Similarly, "Guggisberglied" by Christine Lauterburg and Doppelbock is deeply rooted in Swiss folk traditions and is often performed in communal settings, encouraging active audience participation and storytelling that connects the community to their shared heritage, thus reinforcing the communal nature of the song. "Guggisberglied" was used as the control stimulus in this study because, although communal in Swiss culture, it was not culturally relevant for the sample of US participants. The audio versions of the materials used in the study are provided in the Supplementary Materials.

Measures

In addition to providing demographic information (age, gender, Latino/Hispanic status, race/ethnicity, and employment status), participants reported on their musical training (in years) and completed the Symptom Checklist 27 Plus (SCL-27) [29] and the State Trait Anxiety Inventory-5 (STAI-5) [30]. Participants also completed positive affect and negative affect questionnaires.

Symptom Checklist – 27 Plus. The Symptom Checklist 27 Plus (SCL-27) [29] is a short screening questionnaire that provides a general severity index (GSI) of clinical symptoms. The respondents were asked about depressive, vegetative, agoraphobic, sociophobic, and pain symptoms in addition to other concerns (e.g., headaches, fear of saying something embarrassing, hopelessness). Symptoms are rated according to the frequency with which they occur on a scale ranging from never (0) to very often (4). The internal consistency (Cronbach's alpha) in our sample was excellent to satisfactory (GSI, 24 items $\alpha =$

0.92; subscales: depressive, 5 items $\alpha = 0.84$, vegetative, 5 items $\alpha = 0.78$, agoraphobic, 4 items $\alpha = 0.83$, sociophobic, 5 items $\alpha = 0.91$, pain, 5 items $\alpha = 0.76$).

State-Trait Anxiety Inventory–5 (STAI-5). The STAI-5 [30] is a five-item questionnaire that measures state anxiety using a 4-point Likert scale ranging from not at all (1) to very much so (4). The STAI-5 scale has shown excellent reliability and internal consistency [30]. In our sample, good internal consistency was found for both pre- and post-assessments (Pre $\alpha = 0.83$; Post $\alpha = 0.81$).

Positive affect. To measure positive affect, participants were asked the following questions: (i. PA) *how happy/positive do you feel at the moment?*, (ii. PA) *How excited/motivated do you feel at the moment?*, (iii. PA) *How connected to others do you feel at the moment?*, and (iv. PA) *How much in tune with yourself and your emotions do you feel at the moment?* The questions were presented on a visual analog scale from 0 (not at all) to 10 (extremely), and participants responded using a slider. All items loaded into the same factor (see Figure S1), with good and excellent internal consistency (4 items; Pre $\alpha = 0.89$; Post $\alpha = 0.90$).

Negative affect. To measure negative affect, the following questions were asked: (i.e., NA) *how sad/negative do you feel at the moment?*, (ii. NA) *How anxious do you feel at the moment?* and (iii.) NA) *How self-conscious do you feel at the moment?* Similar to positive affect, questions were presented with a visual analog scale ranging from 0 (not at all) to 10 (extremely). The items also loaded into the same factor (Fig. S1), with satisfactory internal consistency (3 items; Pre $\alpha = 0.75$; Post $\alpha = 0.76$). Questions for positive and negative affect were presented as a block.

Social ostracism manipulation and evaluation. The social media ostracism paradigm (SMOP) was used to induce social exclusion [31]. In brief, participants were asked to create a nickname, choose an avatar, and write a bio to be shared with other people with whom they believed they would be connected to next. Once their profile was complete, participants had three minutes to interact with other preprogrammed profiles. They were informed that they could *like* as many profiles as they wanted and that their profile would also be shown to the other participants, who would be able to *like* their profiles as well. They were informed that there were no limits to the number of *likes* they could distribute. Ostracism consisted of the participant receiving only one *such like*, while other profiles received more (2–9 *likes*). Previous research has shown that the SMOP is suitable for online data collection and is considered effective in inducing feelings and thoughts of social exclusion [31]. A sample of the exclusion condition can be found at <http://smpo.github.io/socialmedia/>. To check the effect of the social ostracism manipulation, participants were asked to respond about their feelings and thoughts during the SMOP (see Table S2 for details), as in Wolf, Levordashka [31]. The SMOP scores ranged from 0 (not at all) to 5 (extremely). The internal consistency scores for SMOP feelings (5 items; $\alpha = 0.86$) and SMOP thoughts (3 items; $\alpha = 0.86$) in our sample were good.

Procedure

The present protocol was approved by the Harvard University-Area Committee on the Use of Human Subjects (IRB21-1685). All data collection for this study was performed online and all methods were performed in accordance with the relevant guidelines and regulations. All participants digitally signed informed consent. After providing demographic information and completing the SCL-27, participants completed the STAI-5, positive affect, and negative affect measures in a randomized order (Pre, T1). They were then directed to the SMOP. Immediately following the SMOP, participants were randomly assigned to the communal or control condition. The communal condition consisted of the audio presentation of “Take Me Out to the Ballgame” Virtual Choir. For the control condition, participants listened to “Guggisberglied” by Christine Lauterburg and Doppelbock. The control song was in German. The musical stimulus was played for 2 minutes 21 seconds. Following the music, participants were asked to complete the positive affect, negative affect, and the STAI scales, once again in a randomized order (Post, T2). Participants rated their familiarity with the music they had listened to and were debriefed on the study objectives following completion of the SMOP feelings and SMOP thoughts. See Fig. 1.

Statistical analyses

Demographic. Given the nonnormal distribution of our data, Mann–Whitney U tests were used for between-group comparisons for continuous (age, musical training, SCL-27, SMOP feelings, SMOP thoughts) and Fisher’s exact tests for categorical (gender, Latinx/Hispanic, ethnicity, and employment status) measures.

Main analyses. To investigate the effects of communal music on affect, we fit linear regression models using the Post (T2) affect scores (positive affect; negative affect) as the dependent variable and condition (communal; control) as the independent variable controlling for Pre (T1) affect scores. Both the T1 and T2 affect measures were log-transformed to address issues of nonnormality and heteroscedasticity. We then used the *anova* function to generate F statistics and p values. Partial η^2 were calculated using the *eta_squared* function in R. Due to the impossibility of log-transformed state anxiety values (the presence of zeros), we calculated a change score ($\text{score}_{T2} - \text{score}_{T1}$) for the state anxiety measure. The choice for this measure was based on our main hypothesis that communal music would reduce the change compared to the control condition. Furthermore, no between-group differences were found in the baseline (T1) scores. Given the nonnormal distribution of the data, Mann–Whitney U tests were used for state anxiety group comparisons.

Follow-up analyses. We used Spearman’s correlations (nonnormal distribution) to examine the relationship between affect change and familiarity with the music presented for significant between-group findings. These correlations were performed for the whole sample and at the group level. Finally, to explore whether characteristics of music other than its communal component (including language) influenced our findings, we repeated the analysis in a subset of native English-speaking individuals who reported not being baseball fans and never having attended a live baseball game. Given that the control song was in a foreign language, we repeated the same procedure as well as the analysis that was found

to be significant in our main sample in a subset of native English-speaking individuals. These individuals were recruited separately and had declared that they were not baseball fans and had never attended a live game ($n = 44$; 23 = communal, 21 = control; see Table S3 for details).

Study 2

Participant recruitment and song selection

As in Study 1, individuals who reported being baseball fans were invited to complete a screening form through Prolific. Individuals who reported having attended a live baseball game in a stadium ($n = 157$) were subsequently invited to participate in the main study, which, again, was presented to them as a separate project. Of those who completed the survey ($n = 143$), two individuals failed the attention checks included in the study and were subsequently excluded from the analyses. We also added a question to ensure that the songs included in the study either had been experienced in a communal setting or not within the past year. More specifically, participants were asked “how many times did you experience the song you listened to in a communal setting in the past year?”. Participants who reported not having experienced the communal stimulus ($n = 13$) or who reported experiencing the control stimulus ($n = 12$) in a communal setting were further excluded from the study. The final sample consisted of 116 participants (see Table 2 for details).

Table 2
Study 2 participants' demographics

	Communal (N = 56)	Control (N = 60)	Statistics <i>p</i> value
Age (years)			
Mean (SD)	39.1 (10.5)	44.3 (11.9)	W = 1261 ^a
Median [Min, Max]	38.0 [21.0, 68.0]	43.0 [26.0, 76.0]	<i>p</i> = 0.020
Sex			
Female	19 (33.9%)	20 (33.3%)	$\chi^2 = 0.000$
Male	37 (66.1%)	40 (66.7%)	<i>p</i> = 1.000 ^b
Latino/Hispanic			
Mean (SD)	1.86 (0.353)	1.97 (0.181)	$\chi^2 = 3.129$
Median [Min, Max]	2.00 [1.00, 2.00]	2.00 [1.00, 2.00]	<i>p</i> = 0.076 ^b
Ethnicity			
Asian	1 (1.8%)	1 (1.7%)	
Black	3 (5.4%)	2 (3.3%)	
Mixed	3 (5.4%)	4 (6.7%)	
Other	3 (5.4%)	0 (0%)	
White	45 (80.4%)	53 (88.3%)	
Missing	1 (1.8%)	0 (0%)	
Employment status			
Due to start a new job within the next month	1 (1.8%)	2 (3.3%)	
Full-Time	37 (66.1%)	34 (56.7%)	
Not in paid work (e.g. homemaker', 'retired or disabled)	1 (1.8%)	8 (13.3%)	
Part-Time	4 (7.1%)	8 (13.3%)	
<i>Note.</i> <i>p</i> -values are comparisons between groups via ^a Mann-Whitney-Wilcoxon, ^b Chi-square, or ^c Welch's T-tests.			

	Communal (N = 56)	Control (N = 60)	Statistics <i>p</i> value
Age (years)			
Unemployed (and job seeking)	2 (3.6%)	1 (1.7%)	
Missing	11 (19.6%)	7 (11.7%)	
Musical training (years)			
Mean (SD)	0.857 (1.42)	1.40 (1.72)	W = 1411.5 ^a
Median [Min, Max]	0 [0, 4.00]	0 [0, 4.00]	<i>p</i> = 0.093
Times you experienced the song you listened to in a communal setting in the past year			
0	0 (0%)	60 (100%)	<i>p</i> < 0.001 ^b
1–3 times	35 (62.5%)	0 (0%)	
4–6 times	10 (17.9%)	0 (0%)	
7–10 times	3 (5.4%)	0 (0%)	
+ 10 times	8 (14.3%)	0 (0%)	
Symptom Checklist – 27			
Depressive symptoms			
Mean (SD)	0.575 (0.694)	0.743 (0.714)	W = 1366 ^a
Median [Min, Max]	0.400 [0, 3.00]	0.600 [0, 3.40]	<i>p</i> = 0.079
Vegetative symptoms			
Mean (SD)	0.779 (0.570)	0.933 (0.571)	W = -1385.5 ^a
Median [Min, Max]	0.600 [0, 2.40]	0.900 [0, 2.60]	<i>p</i> = 0.101
Agoraphobic symptoms			
Mean (SD)	0.545 (0.676)	0.588 (0.782)	W = 1691 ^a
<i>Note.</i> <i>p</i> -values are comparisons between groups via ^a Mann-Whitney-Wilcoxon, ^b Chi-square, or ^c Welch's T-tests.			

	Communal (N = 56)	Control (N = 60)	Statistics <i>p</i> value
Age (years)			
Median [Min, Max]	0.250 [0, 3.00]	0.375 [0, 3.50]	<i>p</i> = 0.951
Social phobia symptoms			
Mean (SD)	1.19 (0.855)	1.16 (0.822)	W = 1708 ^a
Median [Min, Max]	1.00 [0, 3.60]	1.00 [0, 3.20]	<i>p</i> = 0.878
Pain symptoms			
Mean (SD)	1.13 (0.589)	1.38 (0.538)	<i>t</i> = -2.398 ^c
Median [Min, Max]	1.20 [0, 2.40]	1.40 [0.400, 3.00]	<i>p</i> = 0.018
Global Severity Index			
Mean (SD)	0.855 (0.543)	0.976 (0.496)	W = 1440 ^a
Median [Min, Max]	0.750 [0, 2.29]	0.896 [0.208, 2.54]	<i>p</i> = 0.185
<i>Note.</i> <i>p</i> -values are comparisons between groups via ^a Mann-Whitney-Wilcoxon, ^b Chi-square, or ^c Welch's T-tests.			

Experimental and Control Songs

An alternative version of "Take Me Out to the Ballgame" served as the communal stimulus, while "In the Good Old Summertime" was used as the control stimulus, both performed by The Andrews Sisters. These selections enhanced the previous study by enabling control over various musical elements that could influence emotional response, such as affect type, tempo, metric signature, language, and arrangement, as these characteristics have the potential to modulate affect [32, 33]. For more details on the stimuli used in this study, please refer to the Supplemental Materials.

Measures

The same demographic measures reported in Study 1 were collected. Similarly, SCL-27 (Hardt, 2008) was collected. The SCL-27 internal consistency ranged from excellent to satisfactory (GSI, 24 items α = 0.92; subscales: depressive, 5 items α = 0.87, vegetative, 5 items α = 0.76, agoraphobic, 4 items α = 0.88, sociophobic, 5 items α = 0.87, pain, 5 items α = 0.72). Since no significant differences were found between groups for STAI in Study 1, this measure was not included in Study 2.

Positive and Negative Affect Schedule (PANAS). In Study 2, the Positive and Negative Affect Schedule (PANAS) [34]) was used to measure affect. The PANAS is a well-validated tool that includes items that assess both positive (i.e., interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active) and negative (i.e., distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery, and afraid) emotions. Items range from *Very slightly or not at all* (0) to *Extremely* (4). Internal validity for both scales (positive, 10 items; negative, 10 items) was excellent in every time point (all $\alpha > 0.90$).

Modified General Belongingness Scale (Mod-GBS). To assess how much belonging individuals felt while listening to the respective musical stimulus, we included a modified version of the General Belongingness Scale [35]. In the present version, we prompted participants to “think about the song [they] listened to” and respond how they felt “while listening to the music played.” Items ranged from *Strongly disagree* (0) to *Strongly agree* (6), and included statements like “While listening to the music played, I felt included,” “I was reminded of close bonds with family and friends,” “I felt like an outsider,” “I was reminded of people who care about me.” Cronbach’s alpha for the Mod-GBS Belonging scale (9 items) was excellent ($\alpha = 0.94$).

Music affect. Similarly to Mod-GBS, we included 5 questions assessing the affect associated with the musical stimulus presented. We included the following statements: “While listening to the music played, I had positive feelings,” “I felt sad,” “I felt like I had a smile on my face,” “I felt a sense of content,” and “I was reminded of positive memories).” Items also ranged from *Strongly disagree* (0) to *Strongly agree* (6) and were highly internally consistent ($\alpha = 0.92$).

Nostalgia. We further assessed whether the nostalgia brought up by the songs differed between groups. Since this measure was included following reviewers’ suggestions, no specific inventory was used. Instead, we selected items from the Mod-GBS and Music affect that included the expressions “*I was reminded of...*” As the previous scales, internal consistency for nostalgia was excellent (4 items, $\alpha = 0.92$). Items also ranged from *Strongly disagree* (0) to *Strongly agree* (6). As in the previous measures, our measure for nostalgia had excellent internal consistency ($\alpha = 0.92$). See Fig. 2 for a full list of the items included in all three scales.

Negative Autobiographical Memory Recollection Task

To induce negative mood, we asked participants to complete a writing task that involved recalling a negative autobiographical memory. As in Allen and Hooley [36], participants were asked to “write a short paragraph about a time in [their] life when [they] felt worthless, failed to meet the expectations of someone important to [them], and/or a source of shame.” Participants had a least 5 minutes to reflect and complete the writing task.

Procedure

After signing the consent form, participants provided demographic information, completed the SCL-27, and then the PANAS (Baseline, T1). Next, they completed the negative autobiographical memory

recollection task and the PANAS again (post induction, T2). The inclusion of the PANAS here aimed to address a methodological issue from Study 1 (i.e., the absence of a tool to evaluate the effects of the mood manipulation task). They were then randomly assigned to either the communal condition (listening to "Take Me Out to the Ballgame") or the control condition (listening to "In the Good Old Summertime"). Each song lasted 2 minutes, and participants could not advance in the survey until the song ended. Afterward, they completed the PANAS a final time (post music exposure, T3). Participants finally completed the Mod-GBS and Music affect questionnaires and were debriefed about the experiment.

Statistical analyses

Measures. Between-group comparisons for continuous measures were done via Mann-Whitney-Wilcoxon (for nonnormally distributed data) or Welch's t-test (for normally distributed data) and chi-square (categorical variables).

Main analyses. To investigate the effects of communal music on affect, we fit linear mixed models using PANAS scores (positive affect; negative affect) as dependent variables and the interaction of condition (communal; control) and time [baseline (T1); post mood induction (T2); post music exposure (T3)] as fixed effects. Subject was treated as random effects. We also explored between-group differences in GBS-mod, Music Affect, and Nostalgia scores fitting three separate linear models and using the *anova* function to generate F statistics. The *eta_square* function was used to generate effect sizes when appropriate. Every model resulting in significant findings was repeated including the variables that were found to be significantly different between groups (i.e., age and pain symptoms) as covariates. Significance was set at $p \leq 0.05$ for every test in both studies.

Mediation analysis. We ran a mediation analysis exploring the role of sense of belonging (Mod-GBS) as a mediator between change scores in positive affect and condition (communal vs control). Change scores for positive affect ($\text{score}_{T3} - \text{score}_{T1}$) were created. The relationship between the condition and change in positive affect was evaluated using linear regression. To explore the indirect effects of the condition on positive affect change, a mediation analysis was conducted including sense of belonging (GBS-mod) as a mediator. To assess the significance and estimate the confidence intervals of the indirect effects, a bootstrapping method was employed. Specifically, effects were computed for each of the 1,000 bootstrapped samples.

Follow-up analyses. We used Pearson's correlations to examine the relationship between affect change and feelings of belongings associated with the music (GBS-mod). We explored the role of belonging in improving affect in the whole sample and by group. Finally, like in study 1, we examined the relationship between change in positive affect and familiarity as well as change in positive affect and nostalgia with the music listened to.

Transparency and Openness

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study, and the study follows JARS [37]. The data were analyzed using R, version

Results

Study 1

Details for demographic and other measures can be found in Table 1. There were no significant differences between groups for age, gender (although this approached significance, $p = 0.059$), Latino/Hispanic ethnicity, employment status, or musical training (all p values > 0.05). Similarly, no significant difference was found between groups for depressive symptoms ($p = 0.817$), vegetative symptoms ($p = 0.663$), agoraphobic symptoms ($p = 0.507$), sociophobic symptoms ($p = 0.972$), pain symptoms ($p = 0.622$) or GSI ($p = 0.967$) measured by the SCL-27.

No significant differences were found between groups for SMOP feelings ($Mdn_{communal} = 3.4$; $Mdn_{control} = 2.8$; $W = 1501$, $p = 0.534$) or SMOP thoughts ($Mdn_{communal} = 3.6$; $Mdn_{control} = 3.3$; $W = 1479$, $p = 0.629$). In summary, both groups exhibited comparable moderate effects from ostracism, with no significant differences observed between them.

Main analyses. We found a significant difference between conditions across time for positive affect ($F_{(1, 103)} = 8.667$, $p = 0.004$, $\eta^2 = 0.08$). In other words, while self-reported positive affect significantly decreased following SMOP (T2) for the control group, it remained relatively unchanged for the communal music group. No significant difference was found for changes in negative affect ($F_{(1,92)} = 0.114$, $p = 0.7362$) or state anxiety (both groups $Mdn = 0$, $p = 0.988$). See Table 3 for descriptive information and Fig. 3 for more details.

Table 3
Study 1. Descriptive statistics for positive and negative affect by condition

	Communal		Control	
	Means	Standard Deviation	Means	Standard Deviation
Positive Affect (log)				
T1	3.18	0.41	3.10	0.45
T2	3.10	0.51	2.93	0.53
Negative Affect (log)				
T1	1.27	1.32	1.41	1.14
T2	1.28	1.52	1.40	1.34

Follow-up analyses. We did not find a significant correlation between familiarity and change in positive affect ($r(104) = 0.15, p = 0.13$; $r(49)_{\text{communal}} = -0.12, p = 0.41$; $r(53)_{\text{control}} = -0.06, p = 0.65$; Fig. S2).

Study 2

Details for demographic and other measures can be found in Table 2. There was a significant difference between groups for age ($p = 0.014$) and pain symptoms ($p = 0.018$). No other differences were found between groups for demographics and SCL-27 measures.

Main analyses. We found a significant effect of time ($p = 0.030$) and the interaction time * condition ($p = 0.022$) for positive affect. As expected, positive affect significantly decreased, independently of condition, following the negative autobiographical memory recollection, suggesting that the mood induction was successful in worsening affect ($b = -0.18$). Furthermore, individuals in the control condition showed significantly lower positive affect compared to those in the communal condition post music exposure (T3; $b = -0.27$). In other words, listening to the communal music significantly improved positive affect, while listening to a positive affect song with similar musical arrangements did not. See Fig. 4 for means and standard deviations. Further details can be found in Table 4. The inclusion of the covariates (age and pain symptoms) in the model did not alter the result (See Table S4).

Table 4
Study 2. Effects of time and time x condition on positive affect

Effects	Estimate	Standard Error	df	t-value	p-value
(Intercept)	3.16	0.12	163.15	27.16	< 2e-16***
T2 relative to T1	-0.18	0.08	228.00	-2.17	0.03*
T3 relative to T1	-0.32	0.08	228.00	-0.38	0.70
Control relative to Communal	-0.14	0.16	163.15	-0.88	0.38
T2 relative to T1 for Control relative to Communal	-0.08	0.12	228.00	-0.73	0.47
T3 relative to T1 for Control relative to Communal	-0.27	0.12	228.00	-2.30	0.02*

We also found a significant between-group difference for sense of belonging measured in response to the musical stimulus (GBS-mod; $F_{(1, 114)} = 5.054, p = 0.026, \eta^2 = 0.04$). Individuals in the communal condition reported higher sense of belonging ($M = 4.22, SD = 1.22$) than those in the control condition ($M = 3.71, SD = 1.24$). Once again, the inclusion of age and pain symptoms as covariates did not alter the result (Table S5). Music induced feelings (music affect) did not significantly differ between groups ($F_{(1, 114)} = 3.63, p = 0.059$), although there was a trend for increased positive feelings in the communal group.

Finally, although a trend was found ($p = 0.081$), the songs did not significantly differ in levels of nostalgia ($F_{(1, 114)} = 3.08, p = 0.081$).

Mediation analysis. The effect of the condition on positive affect change was mediated by sense of belonging (GBS-mod). The bootstrapped indirect effect was 0.07 (CI = 0.01; 0.16), $p = 0.020$. Figure 5 shows the coefficients.

Follow-up analyses. In the entire sample, we found a significant correlation between the sense of belonging associated with the music (GBS-mod) and change in positive affect ($r(114) = 0.36, p < 0.001$). When looking at the group level, this correlation was more significant for the communal ($r(54) = 0.45, p < 0.001$) than the control ($r(58) = 0.23, p = 0.077$) condition. See Fig. 6 for details. A significant correlation was found between positive affect change and familiarity ($r(114) = 0.24, p = 0.011$) for the whole sample. However, at the group level, familiarity was not significantly correlated with change in positive affect for the communal ($r(54) = 0.09, p = 0.49$) nor the control ($r(58) = 0.05, p = 0.71$) condition (Fig. 7). Finally, a significant relationship between positive affect change and nostalgia was found for the whole ($r(114) = 0.40, p < 0.001$) and for both groups (communal $r(54) = 0.40, p = 0.002$; control $r(58) = 0.27, p = 0.034$). See Fig. 8 for details.

Negative affect. There was a significant effect of time for negative affect ($p < 0.001$). Negative affect post-induction (T2) was significantly higher compared to the baseline (T1), suggesting, once again, that the mood induction was successful in worsening mood. No further effects were found. See Table 5 for details.

Table 5
Study 2. Effects of time and condition on negative affect

Effects	Estimate	Standard Error	df	t-value	p-value
(Intercept)	1.46	0.09	184.10	16.30	< 2e-16***
T2 relative to T1	0.27	0.07	228.00	3.61	0.00***
T3 relative to T1	-0.07	0.07	228.00	-0.91	0.36
Control relative to Communal	-0.04	0.12	184.10	-0.31	0.75
T2 relative to T1 for Control relative to Communal	-0.04	0.10	228.00	-0.37	0.71
T3 relative to T1 for Control relative to Communal	0.05	0.10	228.00	-0.45	0.65

Discussion

The present research explores the potential of communal music exposure as a means to improve affect in the context of social ostracism or negative mood. Our findings suggest that simply listening to communal music, i.e., music previously experienced in a communal setting and leading to an increase in sense of belonging, has the capacity to mitigate (study 1) or repair (study 2) the decline in positive affect typically associated with social exclusion and negative mood, as observed in our control groups. Partially confirming our initial hypothesis, individuals who listened to the communal music following the social media ostracism paradigm and the negative autobiographical memory recollection task reported better levels of positive affect compared to those exposed to the control music experienced, who showed a decline in positive affect. Notably, this effect was evident after brief exposures of roughly two minutes. Furthermore, sense of belonging in connection to the music listened to was significantly higher in the communal vs control condition, while the affect of the song (i.e., how positive it sounded) did not significantly differ between conditions. It is essential to emphasize that, as expected, feelings of exclusion during the social media ostracism paradigm (study 1) as well as global psychopathology symptoms measured by the SCL-27 (studies 1 and 2) did not generally differ between groups.

Communal music may differentially improve positive affect compared to other types of music. While familiar and preferred music impacts wellbeing markers in different samples [15, 18], our findings suggest that communal music's impact might extend beyond mere recognition and preference. Although we did not ask participants to indicate their music preferences, it is very unlikely that the findings are associated with preferences. In other words, it is unlikely that the stimulus used ("Take me Out to the Ballgame") is the group's favorite song. Furthermore, while familiarity was high in the experimental group and low in the control group (study 1), there was no significant association between familiarity ratings and change scores in general or for either group. In study 2, familiarity correlated with change in affect across the entire sample, however, group level analyses revealed no significant correlations between change in positive affect and familiarity, suggesting that other characteristics of the music were driving the effects found.

These findings are likely not due to music characteristics present in one song but not the other. Research has shown, for instance, that timbre (i.e., the identity of a sound), mode (i.e., major/minor), and tempo (fast/slow) differentially modulate emotions [32, 38, 39]. For example, major-mode and fast-tempo songs tend to be associated with happiness, which, in turn, could impact how people perceive and report their own emotions [14]. In study 2, we purposefully included a song with similar characteristics of the communal stimulus (i.e., same mode, similar tempo, similar arrangement, same vocal timbre, etc.) as the control song, and the results remained similar to those found in study 1. Moreover, the nostalgia felt while listening to the song does not fully explain the group differences. The control song in study 2, as the experimental song, also contained lyrics that evoked nostalgia (*in the good old summertime*) and group comparisons were not significantly different. Furthermore, as expected, follow up analyses revealed a significant relationship between positive affect change and nostalgia for the whole sample and both groups, strengthening the idea that the levels of nostalgia did not differ between groups. Finally, while nostalgia seems to be one aspect that differentially increase sense of belonging [20], our results suggest that communality adds to that.

Sense of belonging experienced while listening to the song may explain the boost in positive affect. Participants in the communal music condition reported a higher sense of belonging than those in the control condition, while positive affect associated with the music and nostalgia was less significant. Furthermore, our model revealed that sense of belonging significantly mediated the relationship between the condition and changes in positive affect. Given that a wide base of research has suggested that people's sense of being a member of a specific group can be primed and re-activated through environmental cues [40, 41], our findings suggest that re-exposure to communal music acts as a cue that activates the sense of belonging leading to affect preservation or repair. This finding aligns with previous research that posits that the sense of belonging to a group and feelings of connectedness can provide emotional support and buffer against stress [2, 42, 43], even when experienced in an individual context [44]. Additionally, the effects of communal music may be partially explained by the theory of social surrogacy, wherein music acts as a substitute of the community where the social connections and shared experiences took place. For example, individually listening to church music may not only deepen a person's spiritual engagement but also foster a sense of belonging by evoking feelings of belonging to their religious community.

Positive affect and a sense of belonging are both important factors in mental health [2]. Positive affect (i.e. the experience of emotions such as joy or gratitude) has been shown to play a critical role in resilience and life satisfaction. For example, Cohn, Fredrickson [45] demonstrated that positive emotions predict resilience and overall life satisfaction, even when concurrent negative emotions are present. Similarly, Fredrickson, Tugade [46] found that the experience of positive emotions after the 9/11 tragedies mediated both the relationship between pre-crisis resilience and post-crisis growth and reduced depressive symptoms. These findings are further supported by Tugade, Fredrickson [47], who showed that positive affect mediated the relationship between trait resilience and reduced cardiovascular reactivity during stress, and Ong, Bergeman [48], who observed that high levels of positive affect aid recovery from stressful life events, even amidst increased negative affect. Furthermore, the sense of belonging—one's social identification with a group—has emerged as a crucial determinant of mental health [2]. Research informed by the social identity approach to health underscores that identifying with a social group can reduce depression [49], buffer against stress during life transitions [50], alleviate posttraumatic stress symptoms [51], and reduce burnout while enhancing workplace well-being [52]. Exposure to communal music may provide similar benefits—even if experienced alone.

The integration of these two constructs—positive affect and sense of belonging—is particularly compelling. Positive affect not only promotes resilience and recovery but may also enhance the capacity for individuals to connect and engage socially, reinforcing their sense of belonging. Conversely, a strong sense of belonging within a social group creates conditions that foster and sustain positive affect. Communal music exposure offers a unique and promising avenue to address both these dimensions simultaneously, strengthening social bonds and group identification. This dual impact makes it a valuable tool for improving mental health outcomes, even in contexts of heightened stress or adversity.

Further validation of the use of communal music in music-based interventions may substantially contribute to addressing the urgent need for accessible and cost-effective approaches for mental health treatment. One of the key strengths of music as an intervention is its universal accessibility; it requires no specialized training, making it scalable and broadly applicable. This aspect is especially relevant for people who experience higher levels of social ostracism and negative mood, such as immigrants and refugees [53], putting them at increased risk for the development of psychopathologies, including depression, posttraumatic stress, and anxiety disorders [54, 55]. For instance, creating weekly programs where immigrants and refugees are exposed to relevant communal music may lead to improved affect and warrants further exploration.

Our findings offer promising insights into the potential effects of communal music on emotional wellbeing. However, to build a more comprehensive understanding, further research is critical. First, it is essential to continue exploring the interplay between familiar and communal musical characteristics and their differential effects on mood and affect. Understanding how these aspects interact to influence mood and affect can offer valuable insights into the mechanisms at play. Second, it is important to explore a broader range of types of communal music, encompassing different genres, cultural origins, and contexts. This diversity will help clarify the generalizability of our findings and determine whether certain types of communal music are more effective in particular scenarios. Third, it is possible that, while designed to be a mostly receptive task (i.e., simply listening to the music piece), the nature of communal music may lead individuals to sing along with the song, and this relationship should be further explored. Future research may also evaluate whether communal associations with music can be formed during music interventions among people who do not have strong pre-existing ties to certain identity groups – as these isolated or disconnected groups may be at highest risk of negative mental health outcomes. Another promising area of research involves the exploration of the relationships among communal music, memory, and affect. Investigating how communal music evokes collective memories and how these memories, in turn, influence mood and emotional states can offer profound insights into the intricate interplay between music, memory, and emotion. Similarly, exploring the role of identity recollection when experiencing communal music may lead to interesting findings. Finally, it would be relevant to examine the beneficial qualities of communal music against various mood induction methods and instruments.

Lastly, this study is not without limitations. First, our study focused exclusively on baseball fans. Broadening the participant pool (both in terms of sample size and community where they are drawn from) would enhance the generalizability of our findings and further clarify the role of communal music on affect, specifically disentangling the effects found here from the sports context. Second, as this was a first attempt to study the concept of communal music and its potential as a tool to improve mood, we only included a positive communal stimulus. Future studies should test other types of communal music, including those that are experienced in negative contexts, such as funerals. Third, the measures of sense of belonging, affect associated with the music, and nostalgia need further validation. Even though they were adapted from an existing validated questionnaire (the General Belongingness Scale) [35], studies exploring this measure associated with a specific situation (in this case, the music) would advance the

studies on the topic. Furthermore, the scale used to measure nostalgia was created *a posteriori* following reviewers' comments and may address factors not explored in other studies investigating the construct.

Conclusion

This study investigated the potential of communal music exposure to counteract the consequences of social ostracism and negative autobiographical memory recollection. Our findings suggest that briefly listening to communal music, i.e., songs often experienced in collective environments, can mitigate the decline in positive affect triggered by social exclusion and negative mood. Individuals exposed to communal music maintained relatively stable or increased positive affect levels after experiencing social exclusion and negative mood, while those exposed to control music experienced a decline in positive affect. These findings are promising, as this is the first study, to our knowledge, to suggest that simply listening to a communally experienced song has the potential to improve positive mood following social media ostracism paradigm or the induction of a negative mood state.

Declarations

Classification

Social Sciences – Psychological and Cognitive Sciences

Author Contribution

M.P., D.W.S., and J.H. designed the study. M.P. and D.W.S. performed the experiments. M.P. and S.H. analyzed the data. M.P. and J.H. obtained funding. All authors wrote the paper.

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Data Availability

All data, analysis codes, and research materials are available at https://osf.io/yxn28/?view_only=4afa1499d6324c939ac0e4683524a772.

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Figures

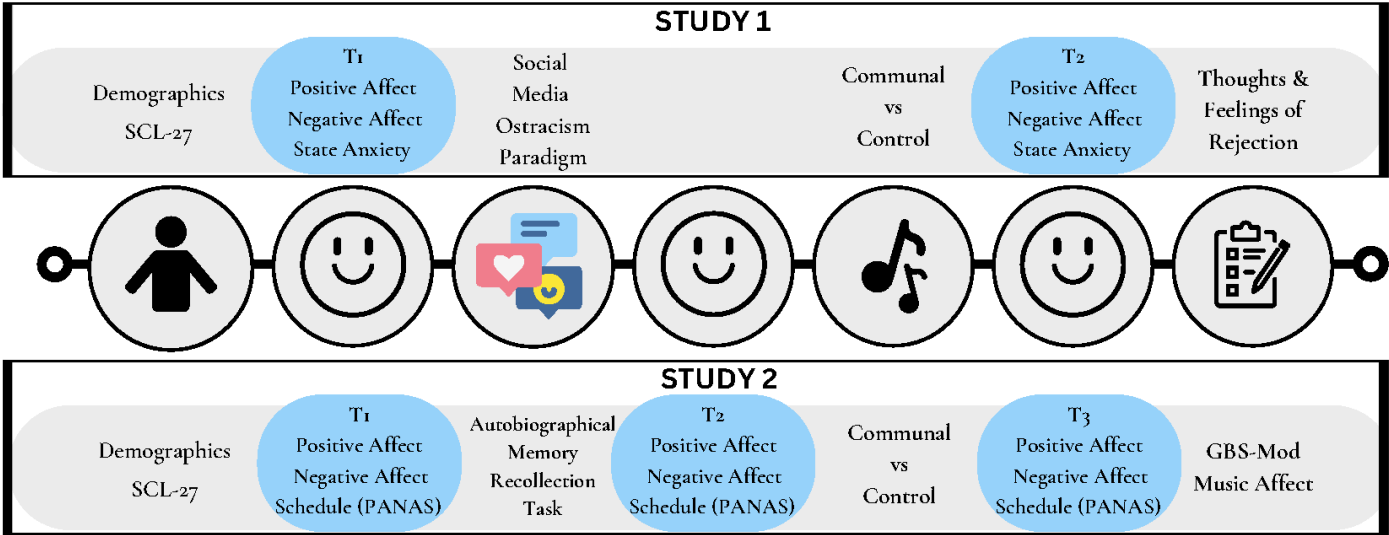


Figure 1

Legend not included with this version

Think about the song you listened to.

While listening to the music played,

I felt included

I was reminded of close bonds with family and friends

I felt like an outsider (*reverse coded*)

I had positive feelings

I was reminded of people who care about me

I was reminded that I feel accepted by others

I felt sad (*reverse coded*)

I felt isolated from the rest of the world (*reverse coded*)

I felt like I had a smile on my face

I felt that I belong

I felt that I have a place at the table with others

I felt connected with others

I felt a sense of content

I was reminded of positive memories

Figure 2

Legend not included with this version

Positive Affect Across Time Points by Condition

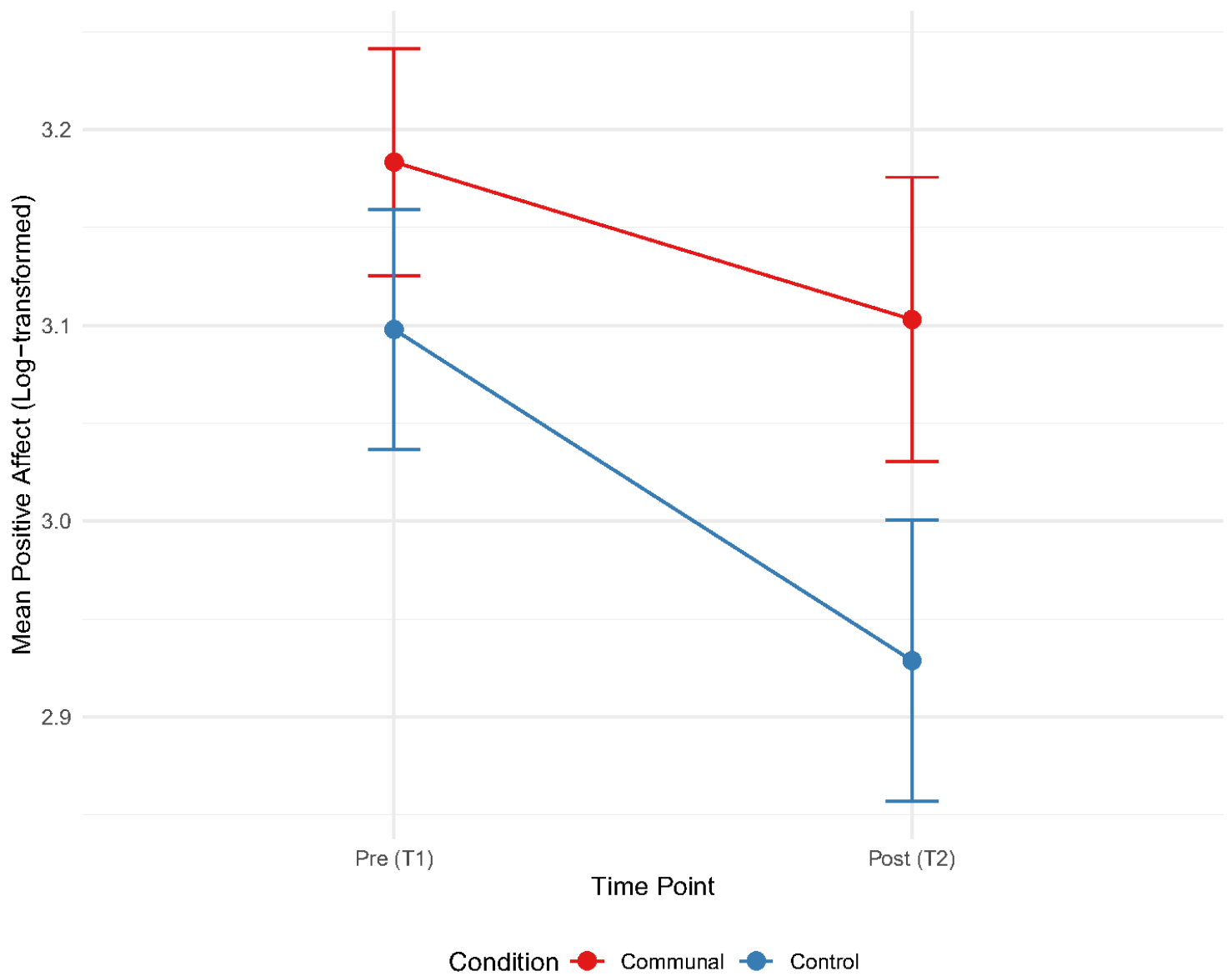


Figure 3

Legend not included with this version

Positive Affect Across Time Points by Condition

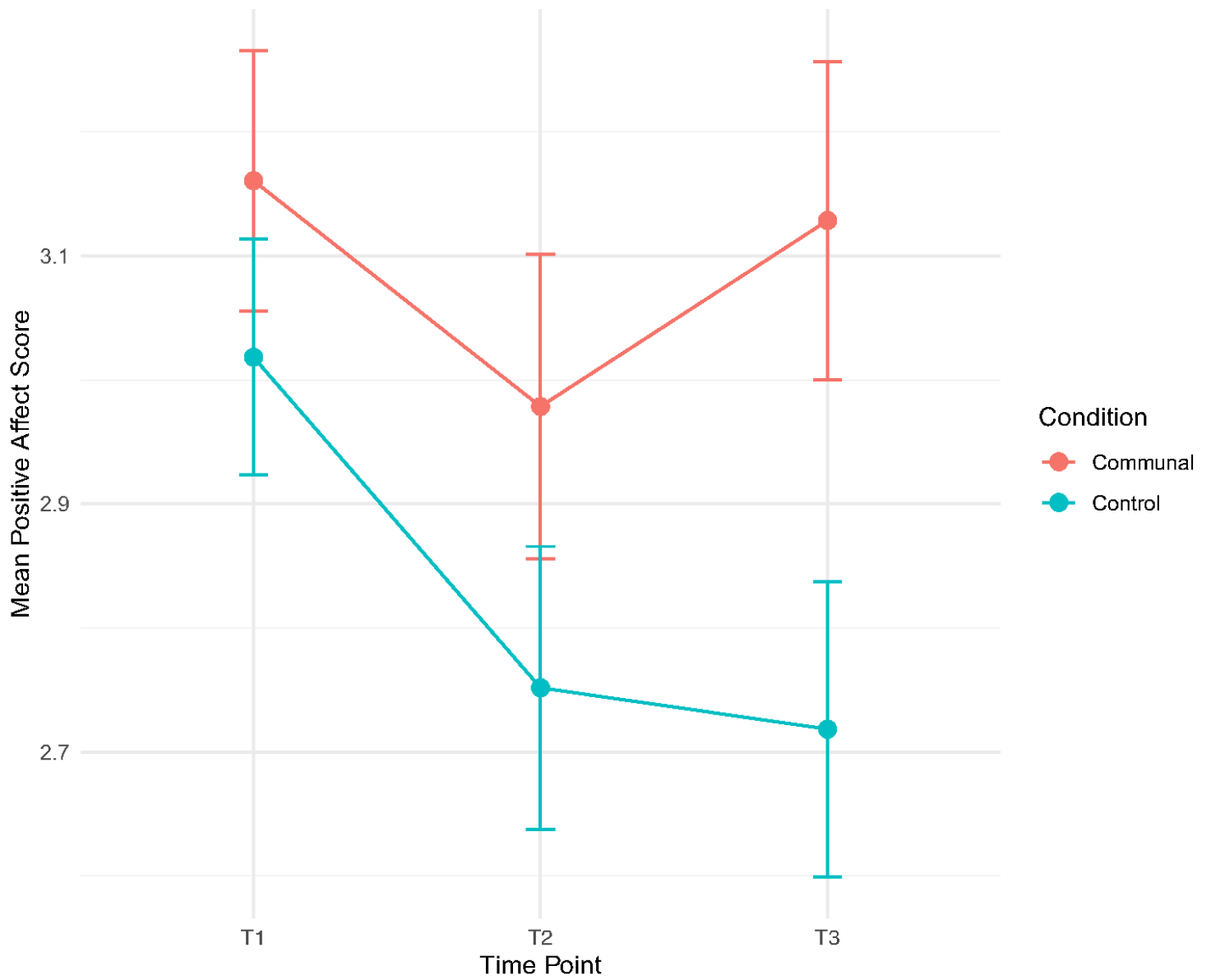


Figure 4

Legend not included with this version

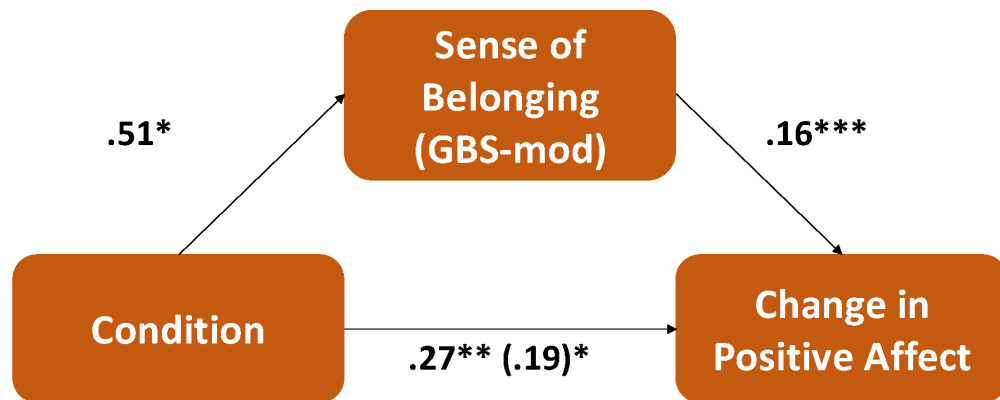


Figure 5

Legend not included with this version

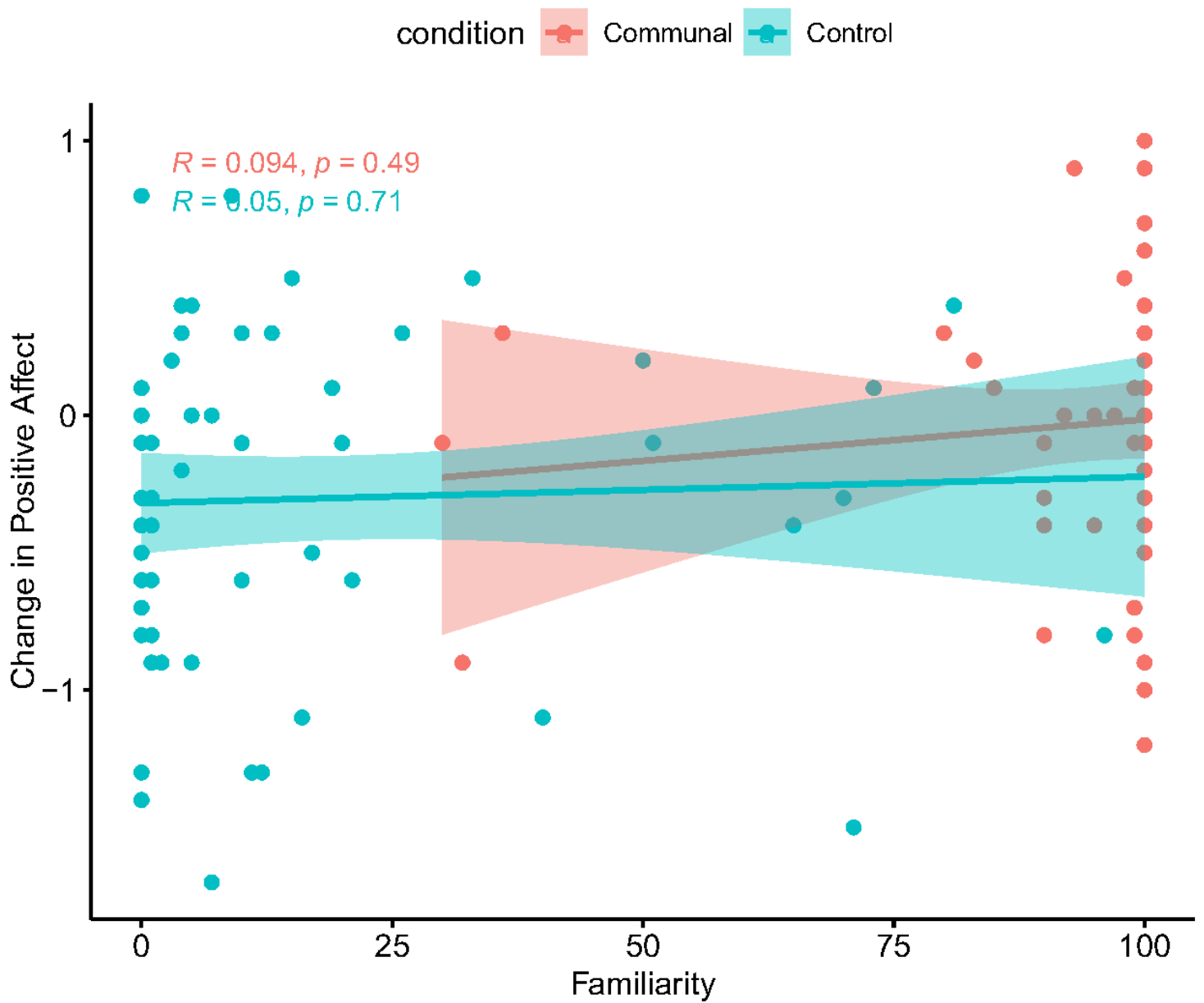


Figure 7

Legend not included with this version

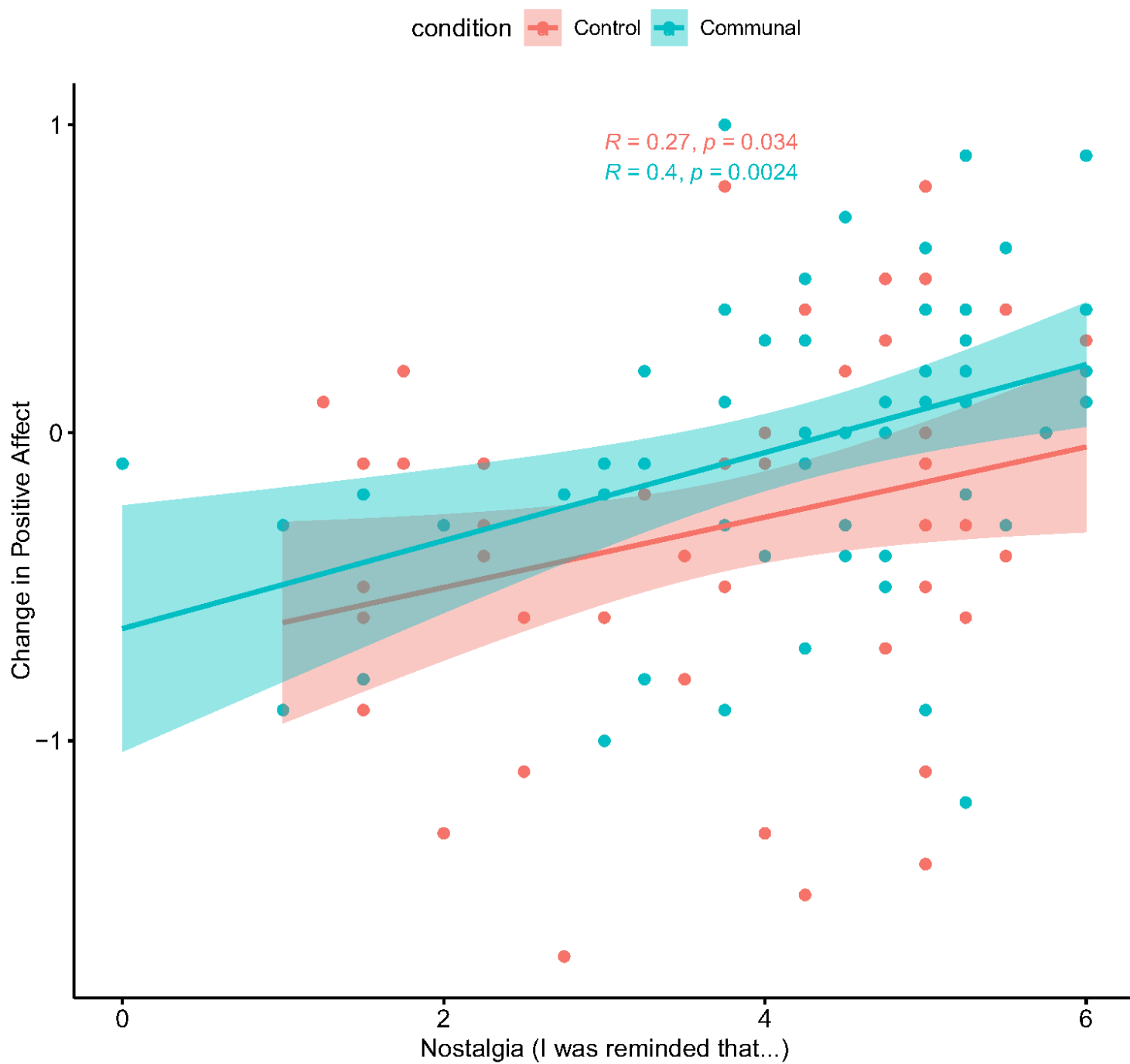


Figure 8

Legend not included with this version

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryMaterials.docx](#)