Social Music: Investigating the Link Between Personal Liking and Perceived Groove

Douglas A. Kowalewski, Taylor M. Kratzer, & Ronald S. Friedman

University at Albany, State University of New York

Integrating methods from experimental social psychology and music perception, we tested the hypothesis that when listeners personally like a musician, they will be more inclined to experience his or her music as both provoking movement and as subjectively pleasurable, the two core features of perceived groove. In Experiment 1, participants were exposed to a set of moderately-syncopated, high-groove drum-breaks which they were led to believe were either produced by a relatively likeable or unlikable musician. In line with predictions, participants led to find the musician more versus less likable rated the same drum-breaks as more evocative of both the urge to move and of feelings of pleasure. When participants in a follow-up study (Experiment 2) were administered the exact same manipulation of likability, but exposed to highly-syncopated, low-groove drum-breaks, these effects were eradicated, suggesting that the results of Experiment 1 were not merely due to demand characteristics or response biases. Together, these findings support the notion that listeners are more responsive to “participating in the music” when they are relatively motivated to affiliate with the musician(s). Methodological limitations and directions for future research on the social psychological underpinnings of groove are discussed.

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In a seminal article, Janata, Tomic, and Haberman (2012) defined musical groove as a pleasurable urge to move the body in response to music. In recent years, a number of studies have been conducted to identify the aspects of musical structure that promote the experience of groove. For instance, using music information retrieval algorithms, Stupacher, Hove, and Janata (2016) found that groove ratings were predicted by variance in the RMS amplitude curve as well as by variance in the frequency spectrum over time (i.e., spectral flux), particularly in low frequency bands. Witek and her colleagues (Witek, 2017; Witek, Clarke, Wallentin, Kringelbach, & Vuust, 2014; see also, Sioros, Miron, Davies, Gouyon, & Madison, 2014) have instead focused on the role of syncopation—the appearance of musical onsets at metrically unexpected moments—showing that the pleasurable desire to move is most associated with moderately syncopated music. According to Witek (2017), an especially common source of groove-inducing syncopation is created by the “...superimposition of two rhythms with different metric tendencies, such as 4/4 against 3/4” (p. 141). She theorizes that such polyrhythmic structures create “gaps” in which metric accents are not accompanied by objective auditory onsets, motivating listeners to move their bodies in order to physically enact the missing beats. This engenders the intrinsically enjoyable sensation of “...losing [oneself] and ...actively becoming the music” (p. 150). Notably, Witek (2017) proposes that gaps in the musical surface do not compel movement, but rather, invite listeners’ participation in the music, implying that listeners must choose whether to accept this invitation or not (see also, Levitin, Grahn, & London, 2018; Senn, Kilchenmann, Bechtold, & Hoesl, 2018).

Given Witek’s (2017) analysis, the question arises: What determines whether listeners will answer this implicit call to participate in the music? Although not explicitly discussed by Witek (2017), one potential clue may be found in the theorizing of Janata et al. (2012), who posit that since “...music implies the actions of a group (the musicians)...high-groove music [may serve] as an invitation to join the group by virtue of inducing an urge to move along with [their] actions” (p. 71; emphasis added). Restated, the groove may be at least partially driven by a desire to affiliate with—to form a personal connection with—the musician(s). This suggests that the experience of groove should be heightened when affiliation motives are stronger. One well-established predictor of the desire to affiliate is personal liking—individuals are most inclined to connect with others whom they like and to avoid interacting with those whom they dislike (e.g., Likowski, Mühlerger, Seibt, Pauli, & Weyers, 2008).
Interestingly, a general link between affiliation motives and body movement has been established in social psychological research on behavioral mimicry. Specifically, Likowski et al. (2008; see also, Stel et al., 2010) have found that when individuals like others, they are automatically more inclined to imitate their facial expressions of emotion. Likewise, Lakin and Chartrand (2003) have shown that when individuals are induced to adopt the goal of affiliating with others, they are subsequently more likely to mimic a stranger’s body language. According to Duffy and Chartrand (2015), mimicry of this sort has important social functions, helping individuals to understand the behavior that they are mimicking and allowing them to nonverbally convey this understanding to those whom they emulate. As a result, mimicry often fosters liking, rapport, and prosociality among interacting individuals, and is therefore associated with a range of social rewards.

Integrating these observations, we hypothesize that when listeners find musicians more likable, they will be more motivated to affiliate with them and thereby more responsive to participating in the music that they create or perform. In turn, this should facilitate the urge to move, at least when the music invites “gap filling” via moderate syncopation (Witek, 2017). Inasmuch as moving to the music may be construed as a form of mimicry—of moving along with the virtual actions of the musician (Janata et al., 2012)—experiencing a heightened urge to move may also engender positive affect inasmuch as mimicry is often socially rewarding (Duffy & Chartrand, 2015). In sum, we predicted that when they like the musician, individuals will be more likely to experience their music as stimulating movement and as subjectively pleasurable, the two core features of musical groove (Janata et al., 2012). We tested this proposition in a large-scale lab experiment, in which we manipulated the likability of the musician and measured the amount of groove participants perceived in the music that he had ostensibly produced.

**Experiment 1**

**METHOD**

**Participants.** Participants were 201 students from the University at Albany (114 female; Age: $M = 19.14$, $SD = 2.82$) who completed the study for partial course credit in an introductory psychology course. Fifty-one (25.4%) reported having at least one year of formal training in music theory and 122 (60.7%) reported at least one year of formal training on a musical instrument.

**Materials.** Musical stimuli consisted of 6 moderately syncopated, two-measure-long drum-breaks adapted from Witek et al. (2014), including rhythms drawn from Pleasure’s “Bounty Lady,” The Winstons’ “Amen Brother,” Assagai’s “Telephone Girl,” Ike and Tina Turner’s “Cussin’ and Cryin’ and Carryin’ On,” Funkadelic’s “Good Old Music,” and Monk Higgins’ “One Man Band” (see Witek et al., 2014, Supporting Information, for musical notation and syncopation measures). Each drum-break was looped four times and played at 120 BPM for a total duration of 16.5 s. The stimuli were transcribed into Sibelius First music notation software (v. 6.0.43; Boersma & Weenik, 2018).

**Procedure.** Upon arrival at the lab, participants were seated at visually-isolated computer workstations and instructed to put on a pair of headphones (Koss UR-20). They were then provided with the cover story:

In this study, we are looking to test people’s perceptions of student musical performances.

The music you will be hearing today has been made by students at UAlbany who produced music for an electronic music course they took last semester. The students were also asked about their experiences at UAlbany and their impressions of the music course. You will later be asked about these details and how they compare to your own experiences. The names of the students have been changed to protect their identity.

You will listen to several rhythms made by each student. Please listen to each rhythm and answer the questions that follow.

Participants were then sequentially presented with the names (Matthew, Jacob, and Martin) and classes (sophomore or junior) of each musician, as well as their purported comments regarding the music course. The comments made by the first two musicians were simply included to bolster the plausibility of the cover story: “It’s pretty cool. I needed to take a music elective and I used to play music with my brother when I was little, so I thought ‘Why not?’” (Matthew), and “I enjoy making music in my spare time, so I took up this class. It’s been a lot of fun so far!” (Jacob). However, the comments of the third musician (Martin) were designed to manipulate his likability by suggesting that he either loved or
hated the university that participants were attending and toward which they tend to have highly favorable attitudes. Specifically, for participants randomly assigned to the *High Likability* group, Martin commented, “I love UAlbany! I have always had a passion for music and I feel at home in this class!”; whereas, for those assigned to the *Low Likability* group, Martin instead commented, “Honestly, I hate UAlbany. I have always had a passion for music, but I don’t feel at home in this class.” Decades of social psychological research has established that attitudinal (dis)similarity robustly predicts (dis)liking (e.g., Byrne, 1971).

As the information regarding a particular musician remained on screen, participants listened to two of the abovementioned drum-breaks, which were ostensibly created by this musician. Following the procedure of Witek et al. (2014), to assess perceived groove, after each drum-break, participants were asked, “To what extent did this rhythm make you want to move?” and “How much pleasure did you experience listening to this rhythm?” on a 7-point Likert scale anchored at 1 (not at all) and 7 (very much). For the final, critical musician (Martin), the drum-breaks were always those of “Good Old Music” and “One Man Band” (see above), with order of presentation counterbalanced between participants. After evaluating Martin’s rhythms, as a manipulation check, participants were asked to rate their attitudes toward all of the musicians in reverse order of appearance (i.e., beginning with Martin): “How much do you think you’d like [Martin]?” and “How much do you think you’d like interacting with [Martin]?”—both on 7-point Likert scales anchored at 1 (not at all) and 7 (very much). Finally, participants completed measures of age, gender, and music training (years of formal training in music theory and on a musical instrument), as well as a measure of attitudes toward the University at Albany: “How much do you like UAlbany?” on a 7-point Likert scale anchored at 1 (very much) and 7 (not at all) and “How would you best describe your feelings toward UAlbany?” on a 7-point Likert scale anchored at 1 (positive) and 7 (negative).

**RESULTS**

**Manipulation check.** According to independent samples *t*-tests, compared to those in the Low Likability (*n* = 101) group, participants in the High Likability group (*n* = 100) rated themselves as more apt to like the critical musician (*M*<sub>High</sub> = 4.79, *SD* = 1.22; *M*<sub>Low</sub> = 3.88, *SD* = 1.44; *t*(194.05) = 4.83, *p* < .0001, *η<sup>2</sup>* = .11), and to like interacting with him (*M*<sub>High</sub> = 4.58, *SD* = 1.11; *M*<sub>Low</sub> = 3.65, *SD* = 1.45; *t*(187.18) = 5.08, *p* < .0001, *η<sup>2</sup>* = .12), confirming that the manipulation of likability was successful. In addition, participants’ self-reported liking for (*M* = 2.68, *SD* = 1.51) and feelings about (*M* = 2.41, *SD* = 1.29) the University at Albany were significantly below the (reverse-coded) scale midpoint, *t*’s > 12.42, *p*’s < .0001, suggesting highly favorable attitudes toward the institution. This supports the assumption that (dis)liking for the critical musician was shaped by perceived differences in attitudinal (dis)similarity.

**Groove ratings.** As in prior research (e.g., Janata et al., 2012; Witek et al., 2014), ratings of the two components of groove, urge to move and listening pleasure, were highly correlated overall, *r*(199) = .86, *p* < .0001. However, following Witek et al. (2014), we analyzed these measures separately. Consistent with predictions, analyses of variance (ANOVAs) revealed that participants in the High versus Low Likability group rated the drum rhythms ostensibly produced by the critical musician as eliciting a significantly greater urge to move (*M*<sub>High</sub> = 4.49, *SD* = 1.36; *M*<sub>Low</sub> = 4.09, *SD* = 1.42; *F*[1, 199] = 4.09, *p* < .05, *η<sup>2</sup>* = .02), as well as more listening pleasure (*M*<sub>High</sub> = 4.44, *SD* = 1.42; *M*<sub>Low</sub> = 3.96, *SD* = 1.52; *F*[1, 199] = 5.19, *p* < .03, *η<sup>2</sup>* = .03) (see Figure 1). Groove ratings for rhythms ostensibly produced by control musicians (i.e., those for whom liking was not manipulated) did not differ between groups, all *p*’s > .17. Notably, when either of the manipulation check measures of attitudes toward the critical musician were included as covariates in the analyses, the effects of Likability on perceived groove were reduced to non-significance, supporting the assumption that the influence of the experimental manipulation on groove ratings was mediated by its impact on liking for the musician. Inclusion of measures of attitudes toward control musicians had no impact on the reliability of the effects of Likability. Finally, in an exploratory vein, we conducted supplementary ANOVAs testing for an interaction between Likability and attitudes toward the university. This enabled assessment of whether individuals with more positive attitudes toward the university would be particularly inclined to rate the critical musician’s rhythms as higher in groove when he expressed pro- versus anti-university sentiments. The results revealed no evidence for any such interaction, failing to support this possibility. Upon consideration, this may simply have reflected a ceiling effect given the highly favorable attitudes generally expressed by participants regarding their school.

Although these initial results were consistent with our hypothesis, they did leave open at least two alternative explanations. First, the findings may have stemmed from a “halo” effect (Thorndike, 1920), in which
participants were biased to rate the music of the likable musician more favorably, irrespective of its structure and, most critically, whether or not it invited movement via moderate syncopation (Witek, 2017). Second, it is possible that despite our attempts to obscure the true purpose of the study using a deceptive cover story and a between-participants likability manipulation, participants were nonetheless able to infer the hypothesis, leading them to artificially modify their groove ratings as a response to perceived experimenter demand.

To help address these concerns, we conducted a follow-up study in which we replicated the procedure of Experiment 1, yet replaced the moderately-syncopated drum-breaks used as critical stimuli with drum-breaks that were relatively high in syncopation and particularly unlikely to elicit groove based on Witek et al.’s (2014) norms. If the likability effect merely reflected a response bias—a tendency to give more “positive” people more positive ratings—as opposed to a heightened receptivity to the invitation to participate in the music, it should be present even when the music lacks the rhythmic features essential to eliciting a groove response (Witek, 2017). Second, to assess whether our initial results may have been due to experimenter demand (Orne, 1962), we newly included a post-experimental suspicion check to determine whether participants were likely to have guessed the hypothesis (see e.g., Blackhart & Clark, 2019). If the Likability effect was due to demand characteristics—that is, to participants’ inference that we expected them to rate the music of more likable musicians more positively—it should be obtained for highly- and not only moderately-syncopated stimuli. In light of these assumptions, we predicted that the effect of Likability would be diminished when the critical musical stimuli were high in syncopation.

**Experiment 2**

**METHOD**

**Participants.** Participants were 181 students from the University at Albany (134 female; Age: \( M = 18.76, SD = 1.22 \)) who completed the study for partial course credit in an introductory psychology course. Fifty-six (30.9\%) reported having at least one year of formal training in music theory and 110 (60.8\%) reported at least one year of formal training on a musical instrument. Thirteen participants were excluded from the analysis based on the results of the suspicion check (see below), leaving 168 participants (125 female). None of the participants had participated in Experiment 1.

**Materials and procedure.** Materials and procedure for Experiment 2 were identical to those for Experiment 1 with the following exceptions: First, the moderately-syncopated drum-breaks used for the critical musician were replaced with 2 highly-syncopated, low-groove drum-breaks composed by Witek and her colleagues (“Experimenter-Composed High no. 5” and “Experimenter-Composed High no. 6”; see Witek et al., 2014, Supporting Information, for musical notation and syncopation measures). As in Experiment 1, the order of presentation of these drum-breaks was
counterbalanced between participants. Second, immediately prior to debriefing, participants were administered a “funneled” suspicion check in which general questions about the study gradually gave way to a more direct inquiry regarding suspicions, thereby giving participants a set of graded opportunities to “confess” any doubts regarding the cover story as well to reveal any beliefs regarding the true nature of the hypothesis (see e.g., Bargh & Chartrand, 2000; Blackhart & Clark, 2019). Specifically, they were asked: “In general, what did you think of the study?,” “Did you enjoy the process of listening to and rating student-created music? Why or why not?,” and “Do you have any suspicions that something was going on in the study that you weren’t told about? If so, please tell us what you think the study was really about and why you think that. If not, enter ‘none.’” The check was administered anonymously via computer to maximize participants’ veracity (Blackhart & Clark, 2019).

RESULTS

Suspicion check. Examination of responses to the post-experimental suspicion check revealed that 13 participants (7.2%) correctly inferred that the study was aimed at testing whether attitudes toward the musician influenced ratings of his music. Although this lends credence to the possibility that experimenter demand is capable of influencing responses within this experimental paradigm, it indicates that participants generally appear to have believed the cover story and failed to guess the hypothesis. (Moreover, participants who explicitly inferred the general purpose of the study may have done so only after the suspicion check led them to retrospectively scrutinize the procedure and to guess the hypothesis after the fact; see e.g., Blackhart & Clark, 2019). As alluded to above, the responses of these 13 participants were excluded from the analyses. The results reported below did not differ based on these exclusions.

Manipulation check. According to independent samples t-tests, compared to those in the Low Likability (n = 82) group, participants in the High Likability group (n = 86) rated themselves as more apt to like interacting with the critical musician (M_{High} = 2.98, SD = 1.38; M_{Low} = 2.43, SD = 1.28; t(165.85) = 2.68, p < .009, \eta_p^2 = .04). Those in the High Likability group also nominally rated themselves as more apt to like the critical musician overall; however, this difference did not attain statistical significance in the present study (M_{High} = 2.31, SD = 1.25; M_{Low} = 2.19, SD = 1.28; t < 1, p = .54, \eta_p^2 = .002). As the rating of anticipated liking for the interaction most directly assesses the motivation to affiliate with the musician—the specific aspect of “liking” hypothesized to impact groove—this suggests that the manipulation was effective. As in Experiment 1, participants’ self-reported liking for (M = 2.68, SD = 1.40) and feelings about (M = 2.22, SD = 1.20) the University at Albany were significantly below the (reverse-coded) scale midpoint, t’s > 12.54, p’s < .0001, suggesting highly favorable attitudes toward the institution.

Groove ratings. Results were analyzed exactly as in Experiment 1. In contrast to the results of the first experiment, ANOVAs revealed no significant differences between participants in the High and Low Likability groups either for ratings of the urge to move (M_{High} = 1.94, SD = 1.19; M_{Low} = 1.73, SD = 0.98; F[1, 166] = 1.70, p = .20, \eta_p^2 = .01) or listening pleasure (M_{High} = 1.89, SD = 1.12; M_{Low} = 1.66, SD = 0.97; F[1, 166] = 1.88, p = .17, \eta_p^2 = .01). As in Experiment 1, there was also no interaction between Likability and attitudes toward the university, suggesting that participants with more positive attitudes in this regard were not more inclined to rate the critical musician’s rhythms as higher in groove when he expressed pro-versus anti-university sentiments. This failure to replicate the results of Experiment 1 using highly-syncopated stimuli suggests that the impact of Likability on groove ratings is sensitive to musical structure and is not merely an artifact of halo effects or demand characteristics.

Discussion

In this study, we tested the hypothesis that when listeners have relatively positive attitudes toward a musician, they will be more inclined to experience his or her music as provoking movement and as subjectively pleasurable, the two core features of perceived groove (Janata et al., 2012). To this end, in Experiment 1, we exposed

1 Consistent with the proposition that the effects of Likability are less robust for low-groove stimuli, when the results of Experiment 2 were combined with those of Experiment 1, the effects of Likability were reduced to nonsignificance, despite the increased power of the analysis resulting from a near doubling of sample size. However, the results of meta-analytic Q tests of heterogeneity suggested that the effects of Experiment 2 (d_{movement} = 0.16; d_{pleasure} = 0.18) did not significantly differ in magnitude from those of Experiment 1 (d_{movement} = 0.28; d_{pleasure} = 0.32); Q_{movement} (1) = .69, p = .40, Q_{pleasure} (1) = .93, p = .33. Therefore, it will be important to conduct additional research manipulating the syncopation level of the musical stimuli within a single experiment to confirm that the effect of Likability is smaller for low versus high-groove stimuli. Ideally, syncopation level should be manipulated using a within-participants design to maximize the power to detect the predicted Groove X Likability interaction.
participants to a set of moderately-syncopated drum-breaks and experimentally manipulated the likability of the musician who had ostensibly created them. In line with predictions, participants led to find the musician more versus less likable rated the same drum-breaks as more evocative of both the urge to move and of feelings of pleasure.

To help rule out the possibility that these results were due to halo effects, we conducted a follow-up study in which we replaced moderately-syncopated, groove-eliciting drum-breaks with highly-syncopated drum-breaks that were pre-rated as low in perceived groove. Moreover, to assess the role of experimenter demand, we appended a post-experimental suspicion check. Results revealed no effect of induced motivation to affiliate with the musician on either the urge to move or feelings of pleasure, suggesting that participants did not indiscriminately rate the music of more likable musicians more favorably. The suspicion check did show that at least some participants were capable of explicitly guessing the connection between the experimental manipulation and the dependent measures. However, given that Experiments 1 and 2 used the exact same manipulation of musician likability, the null results of Experiment 2 suggest that the demand characteristics associated with the manipulation cannot account for the significant impact of likability on perceived groove found in Experiment 1. As such, the present findings remain consistent with the notion that moderately-syncopated music extends an invitation to move (Witek, 2017) and that this invitation is more likely to be accepted when the music is associated with someone with whom listeners would prefer to affiliate.

Although the present study is, to our knowledge, the first to empirically support a link between personal liking and groove, it is also subject to a number of methodological limitations that will need to be addressed in future research. First and foremost, it did not gauge actual movement in response to the musical stimuli. To be clear, the vast majority of extant studies on musical groove have only included self-report measures of the urge to move. In part, this presumably reflects the substantial practical and technical challenges involved in assessing bodily movement as individuals listen to music in real time. It also speaks to the complexities inherent in operationally defining groove: As noted by Levitin et al. (2018 p. 65), “... participants sometimes report that a musical excerpt gives them the urge to move but do not move to it, and participants also sometimes move to music that did not give them a reported urge to move.” Nevertheless, in at least a handful of studies, self-reported groove ratings have been supplemented with objective measurements of body movement based on video coding (e.g., Janata et al., 2012) or psychophysiological indices of motor system activation (e.g., motor-evoked potentials recorded from arm and hand muscles; Stupacher, Hove, Novembre, Schütz-Bosbach, & Keller, 2013). Conceptual replication of the present findings using a measure of overt movement, or at least of implicit action planning, would provide more conclusive evidence for our hypothesis by objectively confirming that the self-reported urge to move is not merely a response bias.

Another limitation of the current study is its inability to clarify the precise mechanism by which positive attitudes toward the musician facilitate musical groove. Conjecturally, one potential mechanism may be extrapolated from the theorizing of Stel et al. (2010), who have proposed that when individuals are more inclined to affiliate, they pay more attention to their interaction partner’s behavior, thereby bolstering uptake of the perceptual input that automatically triggers mimicry. Assuming that groove may be conceived of as a form of mimicking the musician’s virtual actions (Janata et al., 2012), Stel et al.’s proposition raises the possibility that when listeners find a musician more likable, they may attend more closely to his or her music, fostering entrainment of their bodies to the musical beat. Relatedly, Van Baaren, Fockenberg, Holland, Jansen, & Van Knippenberg (2006) have hypothesized that positive affective states render individuals more likely to “act on impulse,” whereas negative affective states breed caution, leading individuals to inhibit their automatic tendencies, including the propensity to mimic others’ behavior. Inasmuch as feelings of personal liking versus disliking entail positive versus negative affect, this notion suggests that groove—the impulse to “mimic the music”—may be facilitated versus inhibited based on the activation of favorable versus unfavorable attitudes toward the musician.

Although the present study only focused on affiliation motives based on attitudinal (dis)similarity, a number of other social psychological factors might also bear on the desire to affiliate with musicians, thereby impacting the urge to move to their music. For instance, listeners may be more inclined to form a personal connection with, and thereby to participate in the music produced by a musician with whom they share social group membership based on ethnicity, gender, race, or class. Likewise, the (un)favorability of the stereotypes that individuals possess regarding members of different groups may affect whether they will emotionally and/or physically engage with music produced by a member of the group, particularly when “individuating” information regarding the musician is limited.
In other cases, the specific contents of stereotypes might contribute to perceptions of groove more directly, irrespective of their influence on affiliation motives. For example, research has shown that African Americans are commonly stereotyped as superior in rhythmic ability (Plous & Williams, 1995). This raises the possibility that listeners may be, however implicitly, biased to perceive music produced by black musicians as higher in groove simply due to their expectation that such music is likely to be more "rhythmic" or danceable.\(^2\)

In conclusion, the present study suggests that the experience of groove does not merely involve an automatic compulsion to move elicited by particular musical structures. Rather, it at least partially reflects the desire to affiliate with the musician(s) by synchronizing one’s movement with the sounds that they produce—the stronger the motive to affiliate, the greater the urge to move to the music and the more pleasure it evokes. To be clear, this does not imply that the structure of the music itself is irrelevant to groove—as discussed earlier, some forms of music may be more likely to set the stage for movement, for instance, by creating “gaps” within a syncopated metrical framework that can be filled by moving the body in synchrony with the beat (Witek, 2017). Consistent with this assumption, we found no effect of musician likability when the critical musical stimuli were too high in syncopation to elicit an urge to move. This suggests that the impact of musical structure on groove may be moderated by the implicit or explicit “sense of social interaction” (Janata et al., 2012, p. 71) inherently associated with musical engagement. We hope that our findings will spur additional research aimed at elucidating the potential social psychological underpinnings of “the groove” and, more generally, at exploring how the social-relational context shapes musical perception, emotion, and behavior.

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Correspondence concerning this article should be addressed to Ronald S. Friedman, Department of Psychology, University at Albany, State University of New York, 1400 Washington Avenue, Albany, NY 12222. E-mail: rfriedman@albany.edu

References


\(^2\) It is important to emphasize that even positive stereotypes, such as those characterizing African-Americans as superior in musical or athletic ability, may foster and perpetuate discrimination against members of stereotyped groups (Czopp, Kay, & Cheryan, 2015).


