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Emotional mimicry of older adults' expressions: effects of partial inclusion in a Cyberball paradigm

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ABSTRACT
As intergenerational interactions increase due to an ageing population, the study of emotion-related responses to the elderly is increasingly relevant. Previous research found mixed results regarding affective mimicry – a measure related to liking and affiliation. In the current study, we investigated emotional mimicry to younger and older actors following an encounter with a younger and older player in a Cyberball game. In a complete exclusion condition, in which both younger and older players excluded the participant, we expected emotional mimicry to be stronger for younger vs. older actors. In a partial inclusion condition, in which the younger player excluded while the older player included the participant, we predicted that the difference in player behaviour would lead to a difference in liking. This increased liking of the older interaction partner should reduce the difference in emotional mimicry towards the two different age groups. Results revealed more mimicry for older actors following partial inclusion especially for negative emotions, suggesting inclusive behaviour by an older person in an interaction as a possible means to increase mimicry and affiliation to the elderly.

Many Western countries have an increasingly ageing population ("WHO|Ageing," n.d.). As a consequence, interactions between younger and older adults are likely to become more frequent. Yet, there are reasons why creating interpersonal rapport and closeness between younger and older adults may not always be easy. These reasons range from a low frequency of contact with the other age group (Ebner & Johnson, 2009), out-group and stereotype perception of older adults by younger adults (Cuddy & Fiske, 2002; Cuddy, Norton, & Fiske, 2005) and reduced perceived closeness to the elderly (Pecchioni & Croghan, 2002) to impaired decoding accuracy of emotion expressions for older compared to younger faces (Freudenberg, Adams, Kleck, & Hess, 2015; Hess, Adams, Simard, Stevenson, & Kleck, 2012; Riediger, Voelkle, Ebner, & Lindenberger, 2011). The effects of these processes on intergenerational interactions, specifically on emotion-related responses to the elderly have so far been understudied. Therefore, the following research tries to narrow this gap by focusing

on one important component of effective nonverbal communication in intergenerational interactions: emotional mimicry.

Emotional mimicry and the elderly

Mimicry refers to the tendency to imitate the vocal, facial, and postural expressions of others (Hess, Philippot, & Blairy, 1999) and has been shown to facilitate the smoothness of interactions and the liking of interaction partners (Chartrand & Bargh, 1999; Lakin, Jefferis, Cheng, & Chartrand, 2003). The mimicry of emotional behaviours is usually considered a form of affective empathy or a "low road" in the empathy process (Walter, 2012). Both behavioural mimicry (Chartrand & Lakin, 2013) and emotional mimicry (Hess & Fischer, 2013, 2014) have been shown to not only depend on affiliation but also to foster affiliation. Recent reviews on emotional (Hess & Fischer, 2013, 2014) as well as behavioural mimicry (Lakin & Chartrand, 2013) concluded that people mimic others'

emotions more in contexts when participants have positive rather than negative attitudes towards each other, or when they are similar rather than dissimilar, or when they belong to the same rather than a different group or want to cooperate rather than to compete with each other. Importantly the relationship is not uni-directional, because emotional mimicry also serves to increase perceived similarity and liking (Hess et al., 1999; Stel, van Baaren, & Vonk, 2008; Van der Schalk et al., 2011; Yabar & Hess, 2007).

In this vein, the Mimicry in Social Relations Model by Hess and Fischer (2013, 2014) posits that emotional mimicry serves a social regulatory function in interactions (see Hess & Fischer, 2013). The model emphasises that mimicry is sensitive to the nature of the relationship with the other person. Whether, or at least the extent to which, one mimics the other's emotion depends on the perceived intentions of the expresser and the observer. These intentions can be inferred from the direction and type of the emotional signal, the relationship between observer and target, and the emotional state or disposition of the observer. Thus, a negative attitude towards the target tends to inhibit emotional mimicry and increase the interpretation of the emotional signal as hostile (e.g. Hutchings & Haddock, 2008) and the opposite is the case when the attitude is positive. Interestingly, Likowski, Mühlberger, Seibt, Pauli, and Weyers (2008) demonstrated that this is the case even when attitudes are newly formed by narratives about a specific character (in this case an avatar).

Based on the common out-group and negatively biased stereotyped perception of the elderly (Hummert, Garstka, Ryan, & Bonnesen, 2004), emotional mimicry towards the elderly is likely to be reduced. Only a few studies have assessed emotional mimicry responses to the elderly. Hühnel, Fölster, Werheid, and Hess (2014) assessed emotional mimicry to short video clips of younger and older actors depicting emotional facial expressions and found no differences in mimicry towards the two groups of actors. This might imply that actors' age does not impact on emotional mimicry. However, in a more social setting of live interactions between younger and older adults, findings revealed more mimicry towards younger compared to older expressers by young perceivers (Kuszynski, Hühnel, Hess, & Asendorpf, 2015). Thus, with increased sociality of the interaction, social context factors such as negative attitudes or out-group perception of the elderly might become more relevant for mimicry of older adults.

In sum, results for emotional mimicry to the elderly are mixed. The current research aimed to focus on emotional mimicry as an index of affiliative intent or closeness between younger and older adults, yet taking contextual factors into account.

The current research: emotional mimicry to the elderly due to social exclusion vs. partial inclusion

Specifically, we wanted to look at previous interactions as a contextual factor that might influence emotional mimicry to the elderly. Specifically, we wanted to create a situation in which older individuals would be perceived more positively. As noted above, the elderly are commonly perceived in more negative, stereotypical and out-group terms by younger adults (Hummert et al., 2004), as a consequence younger individuals are typically perceived more positively and liked more than older individuals when the two are contrasted. In the present research, we created an interaction which would increase positive attitude and liking of older adults relative to younger adults.

We chose *Cyberball* as a means to manipulate attitudes and liking. Cyberball is a game in which participants typically experience either *complete exclusion* or *complete inclusion* by two players in a virtual ball-throwing game (Williams, 2007; Williams, Cheung, & Choi, 2000). Individuals who experience social exclusion are more likely to mimic others (e.g. Kawamoto, Nittono, & Ura, 2014; Lakin, Chartrand, & Arkin, 2008; Williams & Nida, 2011), as exclusion threatens psychological needs such as belongingness and self-esteem (Williams & Nida, 2011). This in turn increases their desire to affiliate with other others in order to reinstate feelings of belongingness. Emotional mimicry which both depends on and fosters affiliation appears to be one means to address these psychological needs after being socially excluded. Thus, Cheung, Slotter, and Gardner (2015) found that participants showed more emotional mimicry after being excluded vs. included (Study 1 and 2). Specifically, excluded participants matched the valence and emotion intensity of target expressions more compared to previously included participants. Additionally, dyads of excluded participants and target individuals were perceived to be socially closer by naïve raters than dyads of included participants and target individuals (Study 3). Thus, we predicted that in a *complete exclusion* condition, in which both a younger and an older player excluded the participant, participants would show an

increased need to affiliate and – in line with the above cited research on mimicry of in-group vs. out-group members – would preferentially mimic an in-group member to do so. Specifically, we predicted that for negative emotions participants would mimic younger but not older models. However, as previous research also has suggested that happiness is mimicked in both in-group and out-group members (Bourgeois & Hess, 2008; Van der Schalk et al., 2011) no specific predictions were made for this emotion.

In our second variant of Cyberball, we created a situation where participants were *excluded* by a member of their in-group (younger adults) and *included* by a member of the out-group (older adults). Thus, in this experimental condition (in the following termed *partial inclusion*), in which the younger player excluded *while* the older player included the participant, we expected that participants would like the including player more as exclusion results in hurt feelings (Tang & Richardson, 2013). If participants feel less rejected or closer to the older than the younger player, they should mimic the older participant to a larger degree. Thus we predicted that for negative emotions, older models would be mimicked but younger would not.

These hypotheses were assessed by examining the age group by condition interaction in the main study. As a first step however, a pilot study tested whether inclusion by an older in contrast to exclusion by a younger player would in fact decrease the difference in feelings of closeness and the perceived out-group status of the older person in contrast to the complete exclusion manipulation.

Pilot study

Method

Participants and procedure

Thirty-nine participants (21 women and 18 men) aged 17–35 years ($M = 24.95$, $SD = 4.75$) were recruited at Humboldt-Universität zu Berlin. Participants were informed that they would play a computer game with two other players who were supposedly seated in another room. Participants would only see pictures of the other players and the other players would see the participant's picture during the game. The pictures of the other players represented a member of the participant's own age group (a younger person of the same sex) and a member of the group of older adults (an older person of the same sex). Congruent

with the cover story, a picture of the participant was taken and the participant was told that this picture would be uploaded but deleted after the game. In reality, the picture was not uploaded and the participant was the only person playing the game; the other players' actions were computer-generated. Participants were told how to play the ball-tossing game and to mentally visualise the others as if they were playing the game in real life. Participants were randomly assigned to either the partial inclusion condition or the complete exclusion condition. In the partial inclusion condition, participants received the ball five out of six times per round from the older player, but only once from the younger player. In the complete exclusion condition, participants received the ball only once per round by each player before the other players exchanged the ball between themselves only. The game consisted of three rounds in total.

Perception of younger and older adults

We adapted the Inclusion of Others in the Self-scale (Aron, Aron, & Smollan, 1992) to measure perceived closeness towards both groups of adults. This scale consists of a series of seven increasingly overlapping pairs of circles representing the participant and the target object. Importantly, the validity of the scale for group identification has been established by Tropp and Wright (2001) and it has been used to measure identification with both animate and inanimate targets (e.g. Schultz, Shriver, Tabanico, & Khazian, 2004, identification with nature and Vallerand et al., 2003, identification with a leisure activity). Participants' instructions following the three Cyberball rounds asked "How close do you feel now to the group of the older persons/younger persons?"

Results

Data for one female participant were excluded from analyses because she suspected that the other players were not real. Thus, the data of 38 participants were used, 19 for each experimental condition.

A two age (older vs. younger persons) by two condition (partial inclusion vs. complete exclusion) ANOVA was conducted on participants' ratings of perceived closeness. Main effects of condition, $F(1, 36) = 4.28$, $p = .046$, $\eta_p^2 = .11$, and age, $F(1, 36) = 25.20$, $p < .001$, $\eta_p^2 = .41$, emerged. These were qualified by a condition by age interaction, $F(1, 36) = 5.30$, $p = .027$, $\eta_p^2 = .13$ (see Figure 1), such that participants felt closer
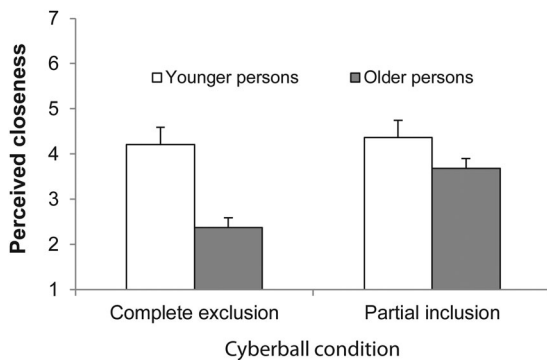
Figure 1. Mean ratings of perceived closeness to younger and older persons as a function of condition. Error bars represent standard errors of the mean.

to younger persons than to older persons after complete exclusion, $t(18) = 4.24$, $p < .001$, $d = 0.97$, as well as after partial inclusion, $t(18) = 2.69$, $p = .015$, $d = 0.62$, but the difference in perceived closeness to younger vs. older persons was significantly smaller after partial inclusion than after complete exclusion. Simple effects analyses conducted for each age group separately revealed a main effect of condition for older persons, $F(1, 36) = 18.20$, $p < .001$, $\eta_p^2 = .34$, but no main effect of condition for younger persons, $F(1, 36) = 0.087$, $p = .769$, $\eta_p^2 = .00$, such that participants felt closer to older persons after partial inclusion than after complete exclusion, whereas no differences in closeness to younger persons between conditions emerged.

Discussion

The findings suggest that the Cyberball manipulation had the desired impact on the perception of closeness to older persons. After complete exclusion, participants reported more closeness to younger than to older adults. After partial inclusion, this difference became noticeably smaller.

Main study

The pilot study showed that inclusion by an older player combined with concurrent exclusion by a younger player during a Cyberball game had an impact on how participants perceived their relation to older adults. Next we wanted to examine whether the same Cyberball manipulation could also influence subsequent emotional mimicry reactions to older adults' emotional expressions.

We expected that in the complete exclusion condition, participants should mimic the negative emotions of younger actors but not the negative emotions of older actors. The reverse was expected for the partial inclusion condition.

Participants were randomly assigned either to the partial inclusion or the complete exclusion condition in the Cyberball game. Following this, participants watched emotion expressions by younger and older individuals while emotional mimicry was assessed.

Method

Participants

Sixty young adults (34 women and 26 men) aged 19–31 years ($M = 23.88$, $SD = 3.10$) were recruited via an online portal for experiments at the Department of Psychology, Humboldt-Universität zu Berlin. Participants were told that the experiment was about social cognition and that they would play a computer game against two other players. Participants were paid 15€.

Procedure

Participants were greeted by the experimenter and seated in front of a computer. They were informed about the study's procedure and following the participants' consent, electrodes were attached to the face.

The study consisted of two parts: first, participants were asked to play the Cyberball game, which included the same instructions and manipulations as described for the pilot study. The second part of the experiment consisted of an emotion decoding task, during which facial electromyography (EMG) was administered. After a 3.5-minute baseline period for the EMG measures, participants watched soundless videos of younger and older actors. Each video was preceded by a two-second fixation period. After each video, participants were asked to rate the depicted emotion expressions in order to ensure that they focused on the expressions in each trial. The videos were presented in random order.

Videos

We used 32 soundless 20 second long videos from a set of stimuli developed and validated by Fölster, Hess, Hühnel, and Werheid (2015). The videos show expressions by younger and older actors who narrated an emotional event they had previously experienced. The subset used consisted of videos depicting four younger and four older actors (2 men and 2

women), each showing happiness, anger, sadness, and disgust.

Facial EMG

Emotional mimicry was assessed using facial EMG on the left side of the face. The electrodes were placed to measure the activity of the Corrugator Supercilii (frown), Orbicularis Oculi (wrinkles around the eyes), the Levator Labii Aleaque Nasii (lifting the upper lip in disgust), and the Zygomaticus Major (lifting the corners of the mouth in a smile), following placements suggested by Fridlund and Cacioppo (1986). Muscular activity was measured using bipolar placements of Easycap Ag/AgCl miniature surface electrodes filled with Signa gel (Parker Laboratories). All electrodes were referenced to a forehead electrode placed near the midline. The skin was cleansed with lemon prep and 70% alcohol. Raw EMG data were sampled using a bioamplifier (MindWare BioNex 3711-08) with a 50 Hz notch filter at 1000 Hz. The signals were band pass filtered between 30 and 300 Hz.

Artefact control and data preparation

The data were offline rectified and smoothed. All video records were inspected for movements such as a yawning and sneezing that could disrupt the EMG measures. Periods corresponding to such movements were set missing and excluded from further analyses. Muscle activity was averaged across all 20 seconds for each trial. Then within subject z-transformed EMG difference scores (trial − last 90 seconds of the baseline) were calculated for each trial.

Results

Seven participants suspected that the co-players were not real, but analyses revealed no differences regarding their mimicry reactions. Therefore, we decided to include their data in further analyses. Each condition consisted of 30 participants.

Emotional mimicry

The presence of emotional mimicry implies a pattern of facial activity in response to the emotional display of others. To assess emotional mimicry, we therefore verified whether a distinct pattern of facial activity emerged in response to the stimuli. For this, the EMG difference scores were first analysed using repeated measures ANOVAs across muscle sites with planned contrasts to assess whether the facial activity conformed to the expected patterns specified as a

function of the mimicry indices described in the following. For happiness, the expected pattern consists of an activation of Zygomaticus Major and Orbicularis Oculi, with concurrent lower activation of Corrugator Supercilii. For anger and sadness, the converse pattern was expected. For disgust, muscle activity pattern was indexed by a high Levator Labii Aleaque Nasii activity compared to a low Zygomaticus Major activity. For *post hoc* tests to compare reactions to young and older models, we created a mimicry contrast score by calculating the specific contrast for each emotion (Hess et al., 2017). One sample *t*-tests were conducted to assess whether contrasts were significantly different from zero and thus indicative of mimicry.

Thus, a two condition (partial inclusion vs. complete exclusion) × 2 actor age (younger vs. older) × 3 muscle site (Corrugator Supercilii vs. Orbicularis Oculi vs. Zygomaticus Major) ANOVA was conducted on facial reactions to expressions of happiness, anger and sadness with condition as a between-subject factor, and actor age and muscle site as within-subject factors. Correspondingly for disgust expressions a two condition (partial inclusion vs. complete exclusion) × 2 actor age (younger vs. older) × 2 muscle site (Levator Labii Aleaque Nasii vs. Zygomaticus Major) ANOVA was conducted.

Happiness. A main effect of muscle site, $F(2, 56) = 92.18$, $p < .001$, $\eta_p^2 = .77$, as well as a site by condition interaction was found, $F(1, 57) = 4.37$, $p = .041$, $\eta_p^2 = .07$. The planned contrast was significant, $F(1, 57) = 184.61$, $p < .001$. The absence of any effect involving age of actor and the significant contrast across conditions suggests that participants mimicked both younger and older actors across both conditions (see Figure 2(a,b), for means and standard errors).

To follow up on this analysis we calculated contrast scores for happiness and conducted a condition by actor age analysis of variance. Only the age by condition interaction was significant, $F(1, 58) = 5.75$, $p = .020$, suggesting that older actors were actually mimicked more intensely in the complete exclusion condition ($M = 1.03$, $SD = .84$) than were younger actors ($M = 0.73$, $SD = .68$) and the reverse was the case in the partial inclusion condition ($M_{young} = 1.06$, $SD = .76$ vs. $M_{old} = 0.69$, $SD = .61$). However, further follow-up analyses revealed that these differences were not significant. As such and in line with previous research, both groups of actors were mimicked when they showed happy expressions.

(a) Complete exclusion
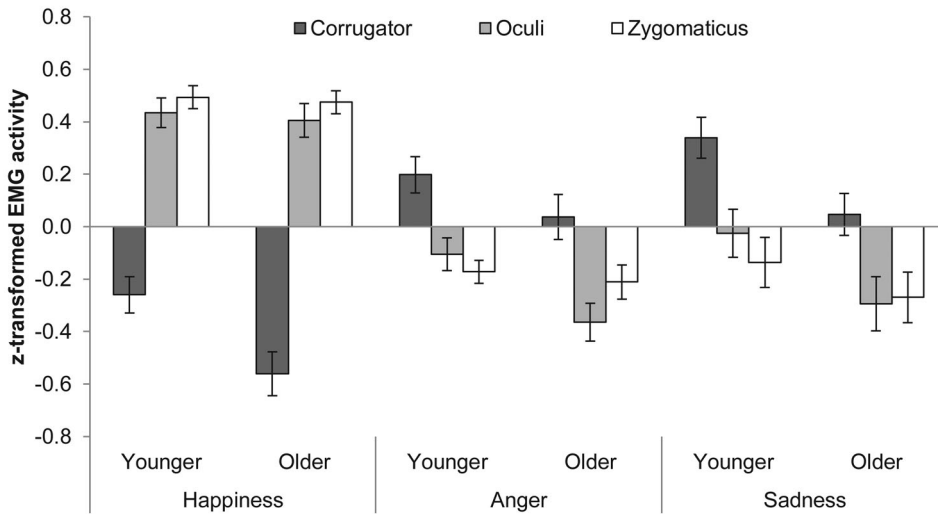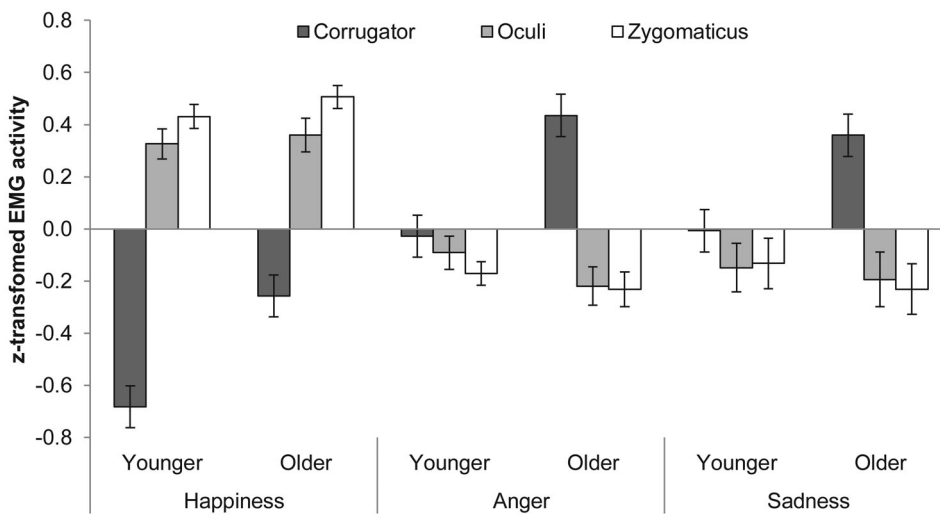

(b) Partial inclusion

Figure 2. Mean EMG activity as a function of actor age (younger vs. older) and muscle site (Corrugator Supercilii vs. Orbicularis Oculi vs. Zygomaticus major) following (a) complete exclusion and (b) partial inclusion.

Anger. A main effect of site, $F(2, 56) = 33.67$, $p < .001$, $\eta_p^2 = .55$, an age by condition, $F(1, 57) = 5.60$, $p = .017$, $\eta_p^2 = .10$, and an age by site interaction, $F(2, 56) = 5.27$, $p = .008$, $\eta_p^2 = .16$, were qualified by an age by condition by muscle site interaction, $F(2, 56) = 4.20$, $p = .020$, $\eta_p^2 = .13$. The planned contrast emerged significantly, $F(1, 57) = 68.55$, $p < .001$ (see Figure 2(a,b), for means and standard errors).

A follow up age by condition analysis of variance was conducted on the mimicry contrast scores and revealed a main effect of age, $F(1, 58) = 5.43$, $p = .023$, $\eta_p^2 = .09$, which was qualified by an age by condition interaction, $F(1, 58) = 4.74$, $p = .034$, $\eta_p^2 = .08$. Specifically, whereas in the complete exclusion condition no significant difference between reactions to older and younger actors emerged and both contrasts were significantly different from 0, a significant age difference, $t(28) = 3.81$, $p < .001$, emerged in the partial inclusion condition. Only the mean mimicry contrast score for older actors ($M = 0.66$, $SD = 0.60$)

was significantly ($p < .001$) different from 0. Thus, in the partial inclusion condition only expressions by older actors were mimicked.

Sadness. A main effect of site, $F(2, 56) = 46.00$, $p < .001$, $\eta_p^2 = .62$, and an age by condition interaction, $F(2,56) = 12.67$, $p = .001$, $= .18$, were qualified by an age by condition by muscle site interaction, $F(2,56) = 4.15$, $p = .021$, $= .13$. The planned contrast emerged significantly, $F(1,57) = 85.07$, $p < .001$ (see Figure 2(a,b), for means and standard errors).

A follow up age by condition analysis of variance was conducted on the mimicry contrast scores and revealed an age by condition interaction, $F(1, 58) = 4.24$, $p = .044$, $\eta_p^2 = .07$. Specifically, whereas in the exclusion condition no significant difference between reactions to older and younger actors emerged and both contrasts were significantly different from 0, a significant difference, $t(28) = 3.27$, $p < .003$, emerged for the partial inclusion condition. Only the mean for older actors ($M = 0.57$, $SD = 0.45$) was significantly ($p < .001$) different from 0. Thus, in the partial inclusion condition only expressions by older actors were mimicked.

Disgust. Main effects of age $F(1, 55) = 4.69$, $p = .035$, $\eta_p^2 = .08$ and site, $F(1, 55) = 6.11$, $p = .017$, $\eta_p^2 = .10$, and an age by condition interaction, $F(1, 55) = 21.31$, $p < 001$, $\eta_p^2 = .28$, were qualified by an age by condition by muscle site interaction, $F(1,55) = 6.14$, $p = .016$, $\eta_p^2 = .10$. As only two muscle sites are involved no further contrast was specified (see Figure 3, for means and standard errors).

A follow up age by condition analysis of variance was conducted on the mimicry contrast scores and revealed an age by condition interaction, $F(1, 55) =$

Figure 3. Mean EMG activity as a function of actor age (younger vs. older) and muscle site (Levator Labii Aleaque Nasii vs. Zygomaticus major) following complete exclusion and partial inclusion.

6.14, $p = .016$, $\eta_p^2 = .10$. Specifically, in the exclusion condition, only a marginally significant difference between reactions to younger and older actors emerged, $t(28) = 1.93$, $p = .064$, but only the contrast for younger models was significantly ($p = .043$) different from 0. In the partial exclusion condition, the difference between contrasts was not significant, but only the contrast for reactions to older actors ($p = .039$) was significantly different from 0. Thus, in the partial inclusion condition only expressions by older actors were mimicked.

General discussion

The findings of the pilot study suggested that partial inclusion by an older player in a Cyberball game can lead to an increase in the perception of closeness to older adults. The main study then tested whether this altered Cyberball version would also lead to different emotional mimicry responses to younger vs. older actors. Specifically, in line with previous research on social exclusion as well as social context effects on mimicry, we expected that participants would mimic the negative expressions of younger actors but not older actors following complete exclusion, because in this condition participants would be specifically motivated to affiliate with in-group members to reinforce feelings of belongingness damaged by the exclusion (Lakin & Chartrand, 2013). Following partial inclusion, we expected that participants would mimic the negative expressions of older actors but not younger actors due to increased liking of the including older player which contrasts with the excluding younger player. The results partially confirm these hypotheses, in fact, older adults were mimicked even more than expected.
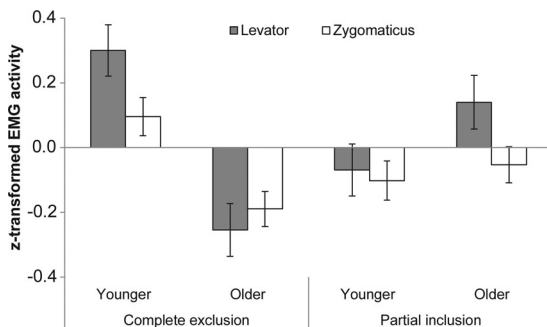
Emotional mimicry to the elderly following partial inclusion

Expressions of happiness were mimicked to similar extend irrespective of the age of the actor. Since smiling incurs low social costs, it was previously found to be mimicked regardless of the social context (Bourgeois & Hess, 2008; Hinsz & Tomhave, 1991). More interesting are the findings for mimicry to negative emotions. Negative emotions shown by out-group members are frequently not mimicked because of the social costs for oneself (Bourgeois & Hess, 2008: Study 2; Van der Schalk et al., 2011;

Weisbuch & Ambady, 2008). Yet, older actors' expressions of anger and sadness were mimicked in both conditions, and even more so after partial inclusion. By contrast, younger actors' expressions of anger and sadness were mimicked after complete exclusion, but not after partial inclusion. Also, disgust expressions of older actors were only mimicked following partial inclusion, whereas disgust expressions of younger actors were only mimicked following complete exclusion.

Thus, participants' mimicry reactions towards younger and older actors were influenced by the previous experience with the younger and older players in the Cyberball game. Inclusive behaviour by the older player in the partial inclusion condition lead to more mimicry for older compared to younger actors in the subsequent mimicry task. Specifically, in the partial inclusion conditions for all three negative emotions, only facial reactions to older participants showed a mimicry pattern.

Increased mimicry has previously been shown in response to social exclusion (Cheung et al., 2015; Lakin et al., 2008). However, in this research complete inclusion and complete exclusion conditions were compared and both conditions involved only in-group members. In the present study, we found that complete exclusion leads to comparable mimicry of in- and out-group members.

As a novel addition to these findings, our results further show that inclusion by an out-group member influences mimicry and perceptions of closeness. Thus, when an out-group member includes whereas the in-group excludes, feelings of closeness to the out-group member increase. In the partial inclusion condition of the following mimicry task, only members of the including out-group were mimicked, thus this group was actually preferred.

This can be explained by the observation that inclusive behaviour can be understood as a positive behaviour and previous research has shown that individuals who are perceived as having a "positive character" are mimicked, whereas those who are perceived as having a "negative character" are not (Likowski et al., 2008). This is especially the case when the positive behaviour by an out-group member is contrasted with the negative behaviour of an in-group member.

This aspect of the research also adds an interesting new insight into social exclusion/inclusion research. Specifically, Chernyak and Zayas (2010) investigated whether the presence of an inclusive player could protect against the negative consequences of social exclusion. Their participants reported similar levels of perceived exclusion and belongingness in the complete exclusion and partial inclusion condition. Participants also falsely recalled that the including player had engaged in exclusion. That is, Chernyak and Zayas (2010) did not find a positive effect of inclusion, whereas in our research such an effect emerged. One possible reason is that fact that group membership was made salient, and thus the diverging behaviour of both players could be more easily perceived and remembered. Therefore, potentially protecting consequences of including behaviour in contrast to simultaneous excluding behaviour seem be more likely if the includer and excluder are perceived to be members of different age groups or can otherwise be easily identified.

Limitations and future research

In the main study, we did not assess the desire to affiliate or liking of members of both groups immediately following the Cyberball manipulation, because we feared that explicit attention to affiliation desires could affect emotional mimicry reactions in unexpected ways. Our pilot study focused on whether participants perceived to be closer to older adults after partial inclusion, but this increase in perceived closeness could potentially be triggered by either increased liking or an attitude change towards the elderly. Future research should investigate the consequences of complete exclusion and partial inclusion on the different aspects of interpersonal attitudes, liking and out-group perceptions in a more differentiated way. Further, our study does not allow conclusions regarding emotional mimicry when both older and younger adults show inclusive behaviour, or what would happen if participants played only with older players.

It would also be of interest to investigate whether our mimicry results due to partial inclusion can be replicated with other social out-groups. Despite some negative attitudes towards the elderly, younger adults also hold a "warmth" stereotype about older adults (Cuddy & Fiske, 2002). The idea of warmth might facilitate the perception of inclusive behaviour as such behaviour is congruent with the warmth stereotype. It is possible that such behaviour is less influential when it contrasts with the out-group stereotype.

Conclusion

The present research shows that a previous experience with two members of different age groups affects subsequent mimicry reactions to other members of these age groups. It appears that a brief interaction such as playing a virtual ball-tossing game for a few minutes is enough to trigger a change in preference of whom to mimic. Importantly, this change in preference was extended to other members of both age groups, since the Cyberball players and video actors were not the same individuals. Mimicry is commonly regarded as a part of the empathic process (Hoffman, 1984; Walter, 2012; Yabar & Hess, 2007). Therefore, inclusive behaviour by an older person in a social interaction could be a fruitful avenue to increase emotion-related responses such as empathy to the elderly by younger adults.

Disclosure statement

No potential conflict of interest was reported by the authors.

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