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Reports

Using extended contact to improve physiological responses and behavior toward people with schizophrenia

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HIGHLIGHTS

- Extended contact improved physiological responses and behavior.
- Participants viewed an interaction with a person with schizophrenia.
- We then monitored cardiovascular and skin response before a real interaction.
- Extended contact buffered stress responses, improved non-verbal behavior.
- Our confederate (blind to condition) also found these interactions more positive.

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ABSTRACT

Extended contact has been shown to improve explicit and implicit attitudes toward a number of outgroups, but not yet toward people with mental health conditions. Using people with schizophrenia as the target group, this experiment is the first to demonstrate that extended contact can reduce explicit prejudice, buffer stress responses to future interactions, improve non-verbal behavior, and improve the quality of interactions in a manner detectable by the target group member. Participants watched a video of a brief, positive interaction between two strangers, one of whom they were led to believe had schizophrenia. Control participants watched the same video without being told that the person had schizophrenia. They then participated in a social interaction with a confederate whom they were led to believe had the disorder. Participants' cardiovascular and electrodermal activity were monitored immediately before the interaction. The interaction was also secretly recorded to allow independent judges to assess the participants' non-verbal behaviors. The confederate also rated the positivity of each interaction. Participants in the extended contact condition reported more positive attitudes toward people with schizophrenia, displayed more positive non-verbal behaviors, and had a more positive interaction with the confederate. Moreover, just prior to the interaction, participants in the extended contact condition displayed smaller anticipatory stress responses, as reflected in smaller changes in interbeat interval and non-specific skin conductance responses during this phase. Together, these findings support the use of the extended contact as an intervention that could lead to genuine changes in attitudes toward and treatment of people with severe mental health disorders.

Introduction

Over 450 million people worldwide are affected by mental disorders (World Health Organization, 2010), and prejudice against these people negatively affects their professional lives (Marwaha & Johnson, 2004), personal lives, and quality of healthcare (Schulze & Angermeyer, 2003; Sylvestre, Nelson, Sabloff, & Peddle, 2007). Even among people with mental health problems, people with schizophrenia suffer from particularly severe (Crisp, Gelder, Goddard, & Meltzer, 2005; Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000) and socially accepted (West & Hewstone, 2012) stigmatization. They are perceived as particularly dangerous, and are particularly feared (Angermeyer & Matschinger, 2003; Angermeyer & Schulze, 2001; Crisp et al., 2000; Read, 2007; Schulze & Angermeyer, 2003).

One of the most widely used, reliably effective social–psychological interventions for reducing prejudice is intergroup contact — interaction with a member of another group (Allport, 1954; Pettigrew & Tropp, 2006). However, though contact can reduce prejudice against people with mental health disorders (Couture & Penn, 2003; Evans-Lacko et al., 2013), identifiable contact with people with schizophrenia is rare, partly because sufferers often hide their condition to reduce the associated stigmatization (Schulze & Angermeyer, 2003). A most helpful

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intervention would provide the benefits of intergroup contact, while eschewing some of the cost and inconvenience (e.g., West & Bruckmüller, 2013; West, Holmes, & Hewstone, 2011).

Extended intergroup contact – observing members of one's own group interacting (positively) with members of another group – offers a means of accomplishing this goal. Thus far, no research has investigated whether extended contact reduces prejudice against people with mental health difficulties. However, much evidence demonstrates that these vicarious experiences of intergroup contact can improve intergroup relations, and rules out several alternative explanations for extended contact's effects (see Turner, Hewstone, Voci, Paolini, & Christ, 2007 for a review). For example Wright, Aron, McLaughlin-Volpe, and Ropp (1997) found that White American students who knew that one of their White friends had a non-White friend, reported lower levels of prejudice against the relevant ethnic group. These effects remained despite controlling for the direct contact that the participants themselves had had with ethnic minorities. Subsequent research has yielded supporting evidence in a range of intergroup settings, such as reducing prejudice against immigrant students (Liebkind & McAlister, 1999) and between Catholics and Protestants in Northern Ireland (Paolini, Hewstone, Cairns, & Voci, 2004).

These vicarious experiences of cross-group interactions have specific benefits: (1) knowledge of positive interactions between an ingroup and an outgroup member can improve perceived ingroup behavioral norms toward the outgroup (2) it can similarly improve perceived outgroup behavioral norms toward members of the ingroup and (3) knowledge of ingroup–outgroup interactions can lead to greater inclusion of the outgroup in the self (Aron, Aron, & Smollan, 1992). Recent research has found support for all three mechanisms. In two studies Turner, Hewstone, Voci, and Vonofakou (2008) found that perception of ingroup norms, perception of outgroup norms, and inclusion of the other in the self mediated the relationship between extended contact and attitudes toward South Asians in the UK. In a quasi-experimental design, Cameron, Rutland, Hossain, and Petley (2011) also found support for these mechanisms using children in the UK as participants and Indian-English children as the target group.

Can extended contact affect physiological responses and subsequent behavior?

As well as investigating extended contact as an intervention for reducing prejudice against people with schizophrenia, this research will also add to the basic understanding of extended contact by investigating its effects on physiological responses, non-verbal behaviors, and the *target group member's* perception of the subsequent interaction. It has been hypothesized that extended contact not only reduces prejudice, but also prepares individuals for real interactions, resulting in more positive intergroup interactions (Eller, Abrams, & Gomez, 2012). This experiment is the first to investigate this claim directly.

Prior research suggests that extended contact should affect physiological responses. Much research demonstrates that people experience anxiety before and during intergroup interactions (see Stephan & Stephan, 1985), and that intergroup contact can reduce some physiological correlates of this anxiety (Mendes, Blascovich, Lickel, & Hunter, 2002; Page-Gould, Mendes, & Major, 2010). Mendes et al. (2002) found that White participants exhibited more cardiovascular threat responses when interacting with a Black confederate than with a White confederate, and Page-Gould et al. (2010) found that prior intergroup contact predicted faster physiological recovery following an interracial task.

It is worth noting that these are not physiological *measures* of anxiety; the relationship between anxiety and physiological responses is complex and no such direct measures currently exist (Cacioppo, Tassinary, & Bernston, 2000). Unsurprisingly there is often a disjunction between explicit measures and physiological correlates of anxiety or stress. For example, Mendes et al. (2002) found a dissociation between self-report measures and physiological responses; despite exhibiting more cardiovascular threat responses, participants reported *more positive* evaluations of Black confederates than White ones. This highlights the value of physiological measures, which are continuous and covert, and can measure responses to intergroup situations that are resistant to self-presentation (Blascovich, 2000; Cacioppo et al., 2000). This is particularly important as we move beyond investigating extended contact's effects on reported attitudes toward investigating extended contact's effects on intergroup behavior.

Although no research to date has employed genuine subsequent interaction, some research suggests that extended contact should positively impact future intergroup relations. Gomez, Tropp, and Fernandez (2011) found that extended contact improved *expectancies* of future intergroup interactions, as well as intergroup attitudes and perceptions of social norms. Importantly, extended contact improved expectancies for both majority (Spanish) and minority (immigrant) group members, and these effects remained even when cross-group friendship and the quality and quantity of prior direct contact were taken into account. Similarly, across three studies using both cross-sectional and longitudinal data, Eller et al. (2012) found that extended contact predicted more voluntary engagement with outgroup members, particularly when there was limited opportunity for direct contact.

Finally, despite the focus on majority-members' attitudes in much contact-based research (Devine, Evett, & Vasques-Suson, 1996) the ultimate goal of direct and extended intergroup contact is improving intergroup relations for both majority and minority group members (Allport, 1954; Pettigrew & Tropp, 2006). The real test of the usefulness of extended contact must, therefore, not be limited to the participants' attitudes, but should include the quality of the subsequent interaction, particularly from the target's perspective (see Devine et al., 1996). This is important because these two goals are sometimes misaligned: participants who attempt to appear less prejudiced may inadvertently appear more prejudiced (Plant, Devine, & Peruche, 2010). Considering these dissociations between motivation, physiological responses, reported attitudes and behaviors, it is very important to investigate whether this ultimate goal of improved intergroup relations is truly achieved by extended contact — something that has never been demonstrated with any target group.

Present research

This research is the first to experimentally test the hypotheses that extended contact (1) improves explicit responses toward people with schizophrenia (2) buffers physiological correlates of anxiety about future contact (3) improves non-verbal behaviors during subsequent contact and (4) improves the quality of subsequent interaction in a manner detectable by an interaction partner.

Our experimental design restricted our mediation model by the order of events; extended contact predicted our outcome variables, and a reversed model could not be considered. We hypothesized that the relationship between extended contact and explicit behavioral intentions would be mediated by explicit attitudes, a relationship found in much contact-based research (see Brown & Hewstone, 2005). We further predicted that participants' non-verbal behaviors would predict the quality of the interaction, as has been observed in social psychology for several decades (see Word, Zanna, & Cooper, 1974). We focused on anticipatory physiological responses because we expected that higher levels of physical activity and physiological arousal *during* the actual interaction could make meaningful differences between conditions harder to discern. Given the complex relationship between physiological responses and explicit measures (Cacioppo et al., 2000), we expected extended contact to buffer physiological correlates of anxiety, but did not necessarily expect these physiological responses to correlate with other measures.

Method

Participants

Forty-five students (25 female, mean age = 22.42) were randomly assigned to an extended contact or control condition. There were no differences in either gender distribution (Fisher's exact test, 2-sided, $p = .77$), or in age between the two conditions, ($M = 22.17$ vs. $M = 22.68$) $t(43) = .51$, $p = .61$. Participant gender did not predict any of our outcome variables ($.18 < p < .98$), nor were there any interactions between participant gender and condition ($.10 < p < .86$). Participants received course credit and none indicated any history of psychosis-related mental health disorders.

Materials and procedure

Participants were ushered into a small research cubicle and instructed to watch a two-minute video showing two people seated in a similar looking cubicle having a friendly interaction — one male and one female, both Caucasian, and in their early twenties. Before watching the video participants in the extended contact condition were told that the male interaction partner had schizophrenia.

The male in the video was a hired actor asked to play the role of someone who had schizophrenia, but to avoid a stereotypical representation. We asked him to read prior research on interactions with non-stereotypical people with schizophrenia (West et al., 2011). This research included specific vignettes about non-stereotypical exemplars like Dr Rufus May, "a clinical psychologist who was diagnosed with schizophrenia at age 18 [and who] travels widely to give presentations on treatment for psychosis.", and Tom Harrell, "a world famous Jazz trumpeter . . . who stopped taking anti-psychotic drugs years ago which . . . make[s] him fit in more with the jazz crowd" (for the full vignettes see West et al., 2011, p. 426–427). We also warned the confederate that the female would believe that he had schizophrenia.

The female in the video was a naïve participant from prior research who in fact believed that the male had schizophrenia. Participants in the control condition watched *exactly the same video*, but were not told that the male interaction partner had schizophrenia. After watching the two-minute video participants were left alone to complete measures of explicit attitude and behavioral intentions toward people with schizophrenia.

Explicit attitude and behavioral intentions

We assessed attitudes using 6 items ($\alpha = .84$) on 7-point semantic differential scales indicating participants' feelings toward people with schizophrenia (from Wright et al., 1997): cold–warm, suspicious–trusting, respectful–contempt (reversed), admiration–disgust (reversed), hostile–friendly, negative–positive. We assessed behavioral intentions with 6 items ($\alpha = .85$) used in similar research (Tam, Hewstone, Kenworthy, & Cairns, 2009). Participants indicated, on 7-point scales (1 = *Not at all*, 7 = *Very much*), how much they would respond in each of the following ways to people with schizophrenia: "talk to them", "avoid them" (reversed), "learn more about them", "have nothing to do with them" (reversed), "spend time with them", "keep them at a distance" (reversed).

Physiological measures and subsequent interaction

We used non-specific skin conductance responses (NS-SCR) and cardiovascular interbeat interval (IBI) as physiological correlates of participants' anxiety during the different phases of the experiment (Fig. 1). Physiological responses were monitored using a MP35 system (BIOPAC Systems, Inc., Goleta, CA) and analyzed with BIOPAC software Acq*Knowledge* 3.9.2 for Mac OS X. Electrodes used to measure NS-SCR and IBI were attached to the participants after the attitude and behavioral intention questionnaires. NS-SCR was sampled at 200 Hz using electrodermal gel electrodes (BIOPAC model EL507) attached to the distal phalanx of the index and middle fingers of the non-dominant hand. A constant voltage (0.5 V) measured skin conductance (cf. Fowles et al., 1981). The NS-SCR was digitized at the electrodes and a 1 Hz filter applied (Gain 2 μmho/V). NS-SCRs were located using a threshold level of 0.05 μmho. Recording of the interbeat interval was sampled at 200 Hz (range: .05–35 Hz) using three electrodes (BIOPAC EL502, Lead II), one the right wrist and the inside of each ankle (the right leg electrode was the ground electrode). The signal was high-pass filtered at 0.5 Hz to obtain a stable baseline with level peaks and no drift. Peaks were detected automatically using a threshold level fixed at zero, to give measures of R–R intervals between beats (interbeat interval, IBI), which is the time between consecutive heart beats from the beginning of one QRS complex to the beginning of the next. The automatic detection of the NS-SCR and QRS complexes by the software was verified visually and corrected in case of misdetection.

Participants were first given 5 min to relax. We then monitored their physiological responses for 2 further minutes of inactivity (T_1, baseline phase). All participants then received the instruction: "In two minutes a person with schizophrenia will knock on this door, come in, sit in this chair and have a brief conversation with you that will last about 2 minutes. Try to have a normal conversation." Participants were then left alone for 2 min (T_2, anticipation phase), after which the confederate knocked, sat in a chair 90 cm from and facing the participant, and engaged the participant in a 2-minute conversation (see Fig. 1, for experimental timeline and prototypical examples of the NS-SCR and IBI data). This two-minute interaction was very similar to the one viewed by the participant; they sat in similar chairs, in a similar-looking cubicle, and at the same distance from each other, and facing each other in the same manner as the people in the two-minute video.

Non-verbal behavior and subsequent interaction quality

The confederate was a Caucasian female in her early twenties, unaware of the nature of the experiment, experimental conditions and hypotheses. It was necessary to warn her that the participants believed that she had schizophrenia in case it was mentioned in the two-minute conversations. However, she was instructed to behave normally, and as this applied to both conditions it could not have affected the present between-group effects. During debriefing all participants reported being convinced that the confederate did in fact have schizophrenia. After the two-minute conversation the confederate rated the positivity of the interaction on a 7-point scale (1 = *Very Negative*, 7 = *Very Positive*).

Without the participants' knowledge, their two-minute interactions were video-recorded using a MacBook placed unobtrusively in the corner of the room. These recordings were later shown to an independent rater who was also unaware of the nature of the experiment, experimental conditions or hypotheses. As both seating distance and shoulder orientation were held constant by this experimental design, the independent rater indicated how much each participant was "maintaining eye contact", "laughing" and "nodding" on a 7-point scale (1 = *Not at all*, 7 = *Very much*; $\alpha = .81$). All three non-verbal measures of positivity have been used in similar research for several decades (Kleck & Nuessle, 1968; Rosenfeld, 1967; Word et al., 1974). A second independent rater judged a subset of the interactions (N = 30) and inter-rater reliability was high ($r = .483$, $p = .002$).

Results

Means and standard deviations of all variables are shown in Table 1. Correlations between all variables are shown in Table 2. We found no significant differences between the extended contact and control conditions in either baseline (T_1) IBI, ($M = .81$ vs. $M = .83$), $t(43) = .38$, $p = .17$ or baseline (T_1) NS-SCRs, ($M = 4.59$ vs. $M =$

2.78), $t(43) = 1.74$, $p = .09$.[1] To reduce noise caused by individual variation in physiological reactivity in both the participants and the BIOPAC electrodes we investigated the effect of extended contact on *change* in physiological responses rather than simply the effect of extended contact on the responses during the different phases. We computed IBI difference scores for the anticipation and interaction phases, by subtracting the mean IBI (in seconds) for the baseline phase (T_1) from those of the anticipation (T_2) and interaction (T_3) phases, such that larger (negative) difference scores reflected a larger *decrease* in IBI and more stress. We similarly computed NS-SCR difference scores by subtracting the number of NS-SCRs in the baseline phase (T_1) from that of the subsequent phases (T_2–T_3), so that higher (positive) difference scores indicated a larger *increase* in the number of NS-SCRs and more stress. In sum, for ΔIBI, larger negative numbers indicated more stress, while for ΔNS-SCR scores larger positive numbers indicated more stress (Fig. 2).[2]

We coded the extended contact condition as 1 and the control condition as −1. We tested the relationship between extended contact, attitudes, behavioral intentions, ΔIBI, ΔNS-SCR, participant non-verbal behaviors and interaction quality using path analysis with observed variables (which can be successfully carried out using smaller numbers than structural equation modeling requires; see Tam et al., 2009). As previously mentioned, we hypothesized that the relationship between extended contact and explicit behavioral intentions would be mediated by explicit attitudes (Brown & Hewstone, 2005) and that participants' non-verbal behaviors would predict the quality of the interaction (Word et al., 1974). Finally, given the complex relationship between explicit and physiological measures (Cacioppo et al., 2000), we expected extended contact to buffer changes in physiological responses, but did not expect these responses to necessarily correlate with other measures.

Our model fit the data well, $\chi^2(15) = 10.39$, $p = .80$, $\chi^2/df = .69$; $CFI = 1.00$; $IFI = 1.08$; $TLI = 1.18$; $RMSEA < .001$, AIC = 50.39, accounting for 46% of the variance in behavioral intentions, 9% of the variance in ΔIBI, 13% of the variance in ΔNS-SCR and 29% of the variance in interaction quality (see Fig. 3). All hypothesized relationships were significant. Extended contact predicted more positive attitudes ($\beta = .414$, $p = .003$), which predicted more positive behavioral intentions ($\beta = .675$, $p < .001$). Extended contact also predicted smaller negative changes in IBI ($\beta = .306$, $p = .033$) and smaller positive changes in NS-SCR ($\beta = -.355$, $p = .012$). Extended contact also predicted more positive non-verbal behaviors ($\beta = .405$, $p = .005$), which predicted more positive interactions ($\beta = .538$, $p < .001$). Extended contact had an indirect effect on perceived interaction quality, mediated by participant non-verbal behaviors ($\beta = .218$), and an indirect effect on behavioral intentions, mediated by attitudes ($\beta = .279$).

We noted the correlations between attitudes and ΔNS-SCR ($r = -.32$, $p = .03$) and between behavioral intentions and ΔIBI ($r = .30$, $p = .045$). We had not hypothesized these relationships. Nonetheless, we tested an alternative model in which these relationships were included. This new model, however, fit the data no better than our proposed, more parsimonious model, $\chi^2(13) = 6.30$, $p = .94$, $\chi^2/df = .48$; $CFI = 1.00$; $IFI = 1.11$; $TLI = 1.29$; $RMSEA < .001$, AIC = 50.23; ΔAIC = .10, $\Delta\chi^2 = 4.09$, $\Delta df = 2$, $p > .10$. Furthermore, neither the path between attitudes and ΔNS-SCR ($\beta = -.213$, $p = .159$), nor the path between behavioral intentions and ΔIBI ($\beta = .222$, $p = .129$) was significant. We also tested a saturated model in which all variables predicted all other possible variables taking into account the order of events (i.e., variables predicted other variables that occurred after them). This saturated model also fit the data no better than our proposed, more parsimonious model, $\chi^2(7) = 6.33$, $p = .50$, $\chi^2/df = .91$; $CFI = 1.00$; $IFI = 1.01$; $TLI = 1.06$; $RMSEA < .001$, AIC = 62.33; ΔAIC = 11.94, $\Delta\chi^2 = 4.06$, $\Delta df = 6$, $p > .25$, and none of the added paths was significant ($.17 < p < .94$).

Discussion

This experiment used an integrated biopsychosocial approach to examine the effects of an extended contact based intervention on attitudes, physiological responses and interactions with people with schizophrenia. Participants who watched a pleasant 2-minute interaction, ostensibly with a stranger with schizophrenia, subsequently reported more positive attitudes and behavioural intentions, exhibited smaller changes in cardiovascular and electrodermal activity, displayed more positive non-verbal behaviors, and subsequently had a more positive encounter than did participants in the control condition, as reported by the interaction partner. Below we discuss these findings in terms of their implications, potential limitations, and suggested avenues for future research.

As Eller et al. (2012) point out, much extended contact literature has focused on the effects of extended intergroup *friendship* (i.e., the knowledge that an ingroup *friend* has a close relationship with a member of another group). However, high-quality direct and extended intergroup friendships can be quite rare, and can be expected to be particularly rare in the case of people with schizophrenia (Dixon, Tredoux, Durrheim, Finchilescu, & Clack, 2008; Schulze & Angermeyer, 2003). Thus, it is particularly important for research to investigate the effect of less intense extended contact with outgroup members — a much more common event. This research demonstrated that watching a very brief interaction between an ingroup member (a person without schizophrenia) and an outgroup member (a person with schizophrenia) led to improved attitudes, behavioral intentions, physiological and non-verbal responses, and a more positive subsequent interaction, despite the fact that the interaction partners were strangers, rather than friends.

Similarly, we demonstrated that even a very brief social interaction (2 min) is sufficient to gather meaningful information on the effect of extended contact on behavior. It speaks to the strength of extended contact that it produced differences in the participants' interaction styles that were detectable by independent coders and a naïve confederate even after such a short duration, as well as significant changes in physiological responses. An important question for future research is whether this approach can also affect long-term behavior, or the formation of deeper, meaningful relationships with outgroup members.

This intervention was based on extended contact and our results are consistent with the extended contact model. However, we acknowledge that this present research cannot rule out certain alternative explanations for our results (e.g., effects of merely observing a counter-stereotypical target). Follow-up research would be necessary to disentangle these effects. However, it is worth noting that this research follows a substantial body of prior research on extended contact that rules out a number of alternative explanations including information and even direct contact (Turner et al., 2007).

Although our intervention positively affected explicit attitudes, non-verbal behaviors and physiological responses, the relationships between the explicit and physiological variables were not significant in our path model. These findings are in line with previous research showing that explicit and implicit bias may function independently (Dovidio, Kawakami, & Gaertner, 2002), and thus are sometimes unrelated or even seemingly contradictory (e.g., Mendes et al., 2002; see also Turner & West, 2012). However, similar to previous research, we did find that explicit attitude mediated the relationship between extended

[1] We note the non-significant, marginal difference in baseline NS-SCRs, however it was not problematic for our research as participants in the extended contact condition initially showed *more* NS-SCRs ($M = 4.59$) than did participants in the control condition ($M = 2.78$).

[2] To rule out the possibility of NS-SCR ceiling effects in T_2 we conducted further analyses investigating the difference in the anticipation phase (T_2) from the baseline phase (T_1) as proportions of both the anticipation phase (i.e., ΔNS-SCR / T_2) and the baseline phase (i.e., ΔNS-SCR / T_1). When these proportions were taken into account, the differences between conditions in these (now non-normally distributed) values remained significant and in the same direction ($U = 134.5$, $Z = -2.33$, $p = .020$ and $U = 82$, $Z = -2.27$, $p = .023$ respectively).

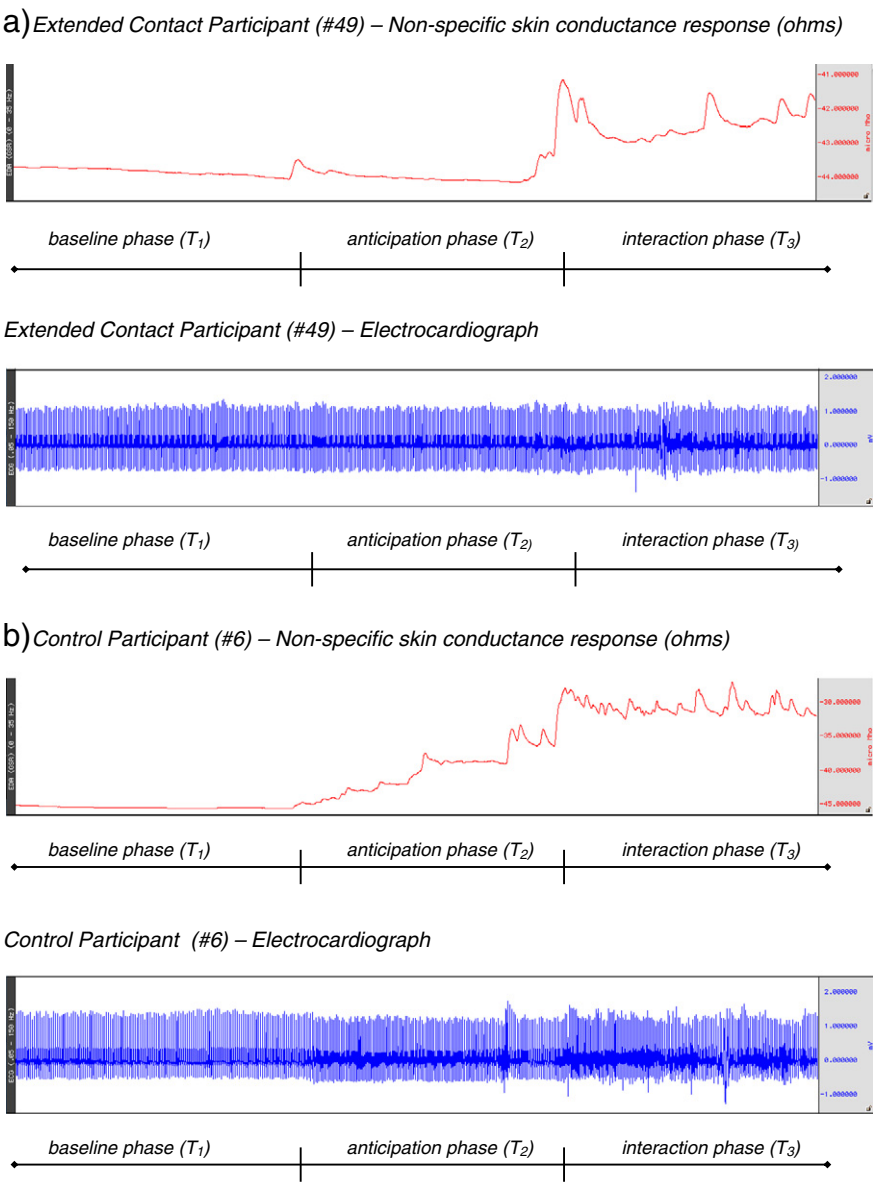


Fig. 1. Prototypical examples of the non-specific skin conductance responses and ECG recording during the three phases of the study, baseline (T1), anticipation (T2), and interaction phases (T3) from one extended contact (a) and one control participant (b). Note the greater increase in NS-SCRs in the control participant during the anticipation phase.

contact and explicit behavioral intentions, while non-verbal behavior mediated the relationship between extended contact and perceived interaction quality. As one of the strengths of extended contact is that it changes perceptions of both ingroup and outgroup norms of intergroup behavior, future research could directly investigate whether perceptions of behavioral norms moderate or mediate the relationships between extended contact and explicit and implicit intergroup bias.

We took care to ensure that the extended contact and control participants underwent exactly the same procedure, with the only difference being that the extended contact participants believed that one of the interaction partners had schizophrenia. It is unlikely that our results can be attributed to demand characteristics as participants were probably not capable of altering their cardiovascular activity and skin conductivity at will to align with the wishes of the experimenter. We assessed participants' behavior as they interacted with a confederate who did not in fact have schizophrenia. Although this may raise questions of external validity, all participants *believed* that they were interacting with someone who was suffering from this disorder. We therefore believe that the findings provide an accurate reflection of how participants *would* behave toward a person with schizophrenia, and a useful indication of how s/he would feel about the interaction. Nonetheless, future research with genuine outgroup members should offer important insights into the effects of extended contact on real intergroup interactions.

Conclusions

Although some previous research has suggested that extended contact should prepare people for direct contact by changing their attitudes toward and expectancies of outgroup members (Eller et al., 2012), this research is the first to provide direct evidence that this goal can be accomplished. We demonstrated that extended contact not only leads to more positive explicit outgroup attitudes and behavioral intentions, but also reduces anticipatory physiological responses and improves non-verbal behavior and the quality of subsequent intergroup interactions. These findings show that extended contact interventions can go beyond the participant involved and genuinely improve intergroup interactions for outgroup members who may meet the participant later. Thus, they provide compelling support for the use of extended contact as an intervention to improve the treatment of people with mental health disorders.

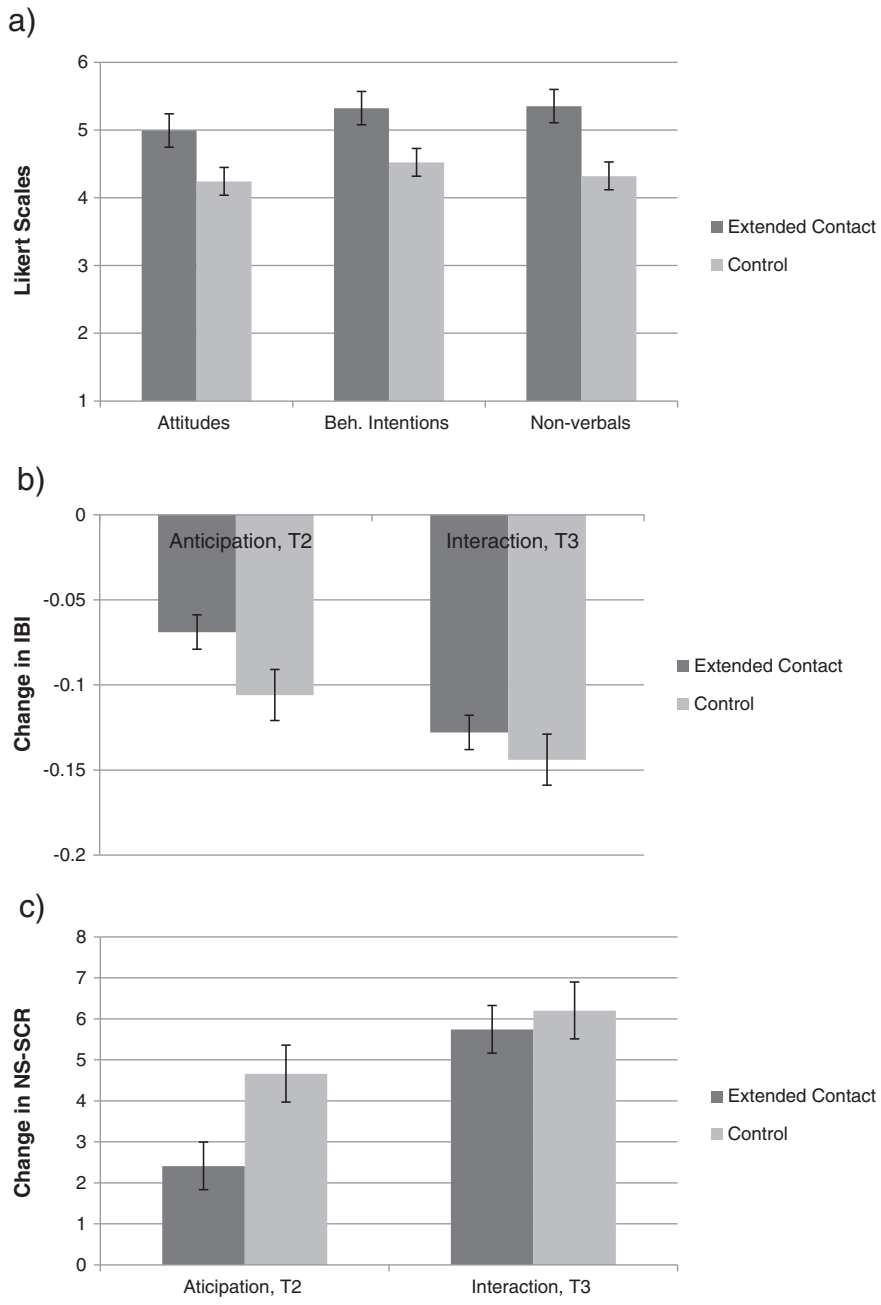


Fig. 2. (a) Participants who watched someone talk to a person with schizophrenia reported more positive attitudes and behavioral intentions toward people with schizophrenia. During the anticipation phase participants in the extended contact condition experienced smaller negative changes in interbeat interval (b) and smaller increases in NS-SCRs (c), both correlates of anxiety. Bar graphs represent mean difference scores. Error bars represent standard errors of the means.

Table 1
Means and standard deviations of outcome variables according to condition.

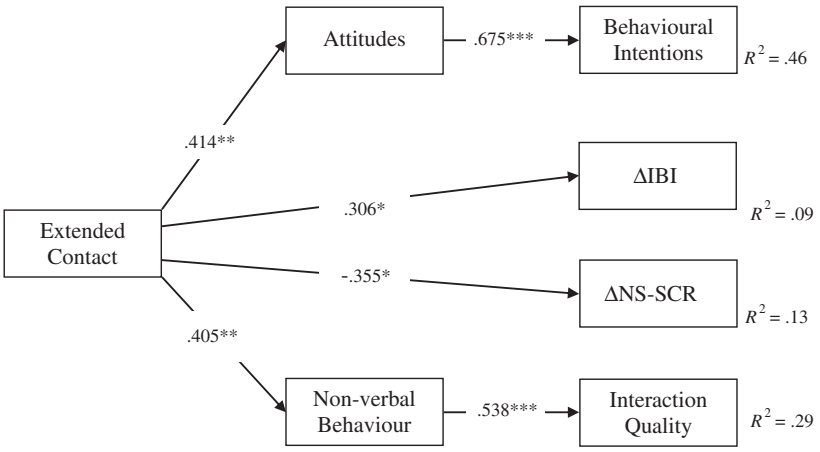
	Extended contact	Control
Attitudes	4.99 (.91)	4.24 (.77)
Behavioral intentions	5.31 (1.23)	4.52 (.99)
Non-verbal behavior	5.35 (1.41)	4.32 (.96)
Interaction quality	6.95 (1.31)	6.48 (.21)
$\Delta IBI_{(T2:\ anticipation)}$	−.069 (.049)	−.106 (.070)
$\Delta IBI_{(T3:\ interaction)}$	−.128 (.124)	−.144 (.098)
$\Delta NS\text{-}SCR_{(T2:\ anticipation)}$	2.41 (2.79)	4.66 (3.26)
$\Delta NS\text{-}SCR_{(T3:\ interaction)}$	5.74 (3.76)	6.20 (3.55)

Notes: Standard deviations shown in parentheses. With the exception of physiological measures, all scales have a minimum of 1 and a maximum of 7. NS-SCR scores are per minute.

Table 2
Correlations between variables.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Condition	1						
2. Attitudes	.414**	1					
3. Intentions	.345*	.675***	1				
4. Non-verbal	.387*	.259	.087	1			
5. Interaction	.249	.193	.016	.554***	1		
6. ΔIBI	.306*	.185	.301*	.068	.122	1	
7. ΔNS-SCR	−.355*	−.324*	−.265	−.165	−.159	.321*	1

Note:
1) $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
2) While a *decrease* in NS-SCR correlates with less stress, an *increase* in IBI correlates with less stress.



Model Fit: $\chi 2(15) = 10.39$, $p = .80$, $\chi 2/df = .69$; *CFI* = 1.00; *IFI* = 1.08; *TLI* = 1.18; *RMSEA* < .001, AIC = 50.39

Note:

1) $*p < 0.05$, $**p < 0.01$, $***p < 0.001$
2) While a *decrease* in NS-SCR correlates with less stress, an *increase* in IBI correlates with less stress.

Fig. 3. Relationships between extended contact, attitudes, behavioral intentions, physiological responses, participants' non-verbal behaviors and the confederate's perception of the interaction.

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