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Title: Acceptance and values clarification versus cognitive restructuring and relaxation: A randomized controlled trial of ultra-brief non-expert-delivered coaching interventions for social resilience.

Running head: Brief Interventions for Social Resilience

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Highlights

- Our intervention design considered resource restrictions common to support services
- All interventions were delivered by a non-expert in a single 1hr session
- We measured the physiological and self-reported aversive effects of Cyberball
- Those in the Acceptance and value-based condition remained socially engaged following Cyberball
- AAQ-II scores did not change conditional on the intervention type

Abstract

Low social resilience (e.g., susceptibility to social anxiety, and social avoidance) has been associated with poor mental and physical health outcomes, and can lead to ostracism. Support services such as university counselling centres, which deal with non-diagnosable psychological distress, linked to low social resilience, require effective yet brief interventions deliverable by non-experts to meet service demands. As it is not always possible to prevent subjectively negative experiences, acceptance-based interventions aim to change how we respond behaviourally to such experiences. The present study tests the efficacy of an ultra-brief (1hr) non-expert delivered acceptance- and values-based (AV) coaching intervention to increase resilience to negative social interactions. This was compared to a comparable dose of a cognitive restructuring and relaxation-based (CRR) analogue, and a psycho-education and progressive muscle relaxation-based (PE-PMR) control. Participants (N=60) were assessed on perceived burdensomeness, belonging, and 3 scenarios measuring anxiety and likelihood to engage in social situations. Participants then played Cyberball, an ostracising task, before recompleting the aforementioned measures. Physiological measures indicated Cyberball was an aversive experience. In the AV condition only, we observed an improved behavioral intention to engage with social scenarios (d_{ppc2} = .57). Ultra-brief AV-based coaching interventions delivered by non-expert coaches appear promising in increasing participant's likelihood to continue engaging in social interactions after a stressful social experience. We tentatively conclude that gains in committed action may increase the propensity of at-risk individuals to seek social support.

Introduction

Adverse effects of ostracism

Perceiving oneself to be ostracised can lead to negative mental health outcomes (Williams, 2007). Ostracism — being ignored and excluded by others (Jamieson et al., 2010) — is an aversive social experience which can affect one's self-esteem and belonging (Zadro et al., 2004), social anxiety (Zadro et al., 2006), moral values (Poon, 2019), self-regulatory abilities (Oaten et al., 2008), sleep patterns (Waldeck et al., 2017, 2020), mood and motivation (Lustenberger & Jagacinski, 2010), cognitive ability (Buelow et al., 2015) and job performance (Steinbauer et al., 2018).

One's response to experiencing ostracism can be to avoid social interactions (Waldeck et al., 2020) or become aggressive (Warburton et al., 2006), likely decreasing the probability of positive social interactions in the future. This could lead to those with existing mental health difficulties becoming increasingly lonely over time (Richardson et al., 2017; Wang et al., 2019), especially if they are temperamentally more introverted (Ren et al., 2016). Avoiding social interactions following an adverse social experience, such as experiencing ostracism, may result in loneliness and a lack of social support, shown to exacerbate a host of mental health difficulties (Wang et al., 2018). Moreover, the relationship between social belonging and well-being is especially high for those who have higher levels of depression (Steger & Kashdan, 2009), suggesting that depressed individuals might be more sensitive to social acceptance and rejection cues. Ostracism could therefore have increasingly severe negative outcomes for an individual over time. Indeed, the effects of social ostracism are so pervasive that they not only impact us when our in-group rejects us, but also when we are rejected by a group to which we have no interest in belonging (Gonsalkorale & Williams, 2007).

Sebastian and colleagues (2010) suggest that the negative affective consequences of perceived social ostracism are especially pronounced in young people. While ostracism's effects can be moderated by social resilience (Niu, Sun, Tian, Fan, & Zhou, 2016), it may be harder to do so under certain circumstances. For instance, the transition from school to college/university which typically involves making new friends (Buote et al., 2007), and where one's establish social support can be lacking. This could increase social isolation, that is, an objective physical disconnect from others (John T. Cacioppo & Hawkley, 2009). Students may therefore be especially vulnerable to ostracism if experiencing the effects of social isolation.

Social resilience as buffer against ostracism

The effects of ostracism on well-being depend one's levels of social resilience (Niu et al., 2016; Waldeck et al., 2015). Increasing resilience to negative social experiences, such as ostracism, should therefore be a primary focus of intervention development. For instance, perseverance in the face of social anxiety and approaching social interactions would foster continued social support in the future, potentially decreasing the adverse effects of ostracism.

Establishing social contact may act as a buffer against the negative effects of social exclusion, as this is linked with a host of salutary physical (Uchino et al., 2018) and mental (Fasihi Harandi et al., 2017) health outcomes. Encouragingly, even minimal social contact can increase one's sense of belonging (Sandstrom & Dunn, 2014). However, developing interventions to help *re*-establish social contact may be quite difficult. Ostracised individuals are more likely to display aggressive and impulsive behaviours because group behavioural norms wane in power as people feel more distant from a particular group, making social re-engagement more difficult (Buelow & Wirth, 2017; Poon & Teng, 2017).

To mitigate the effects of ostracism and build social resilience, certain psycho-therapeutic processes may be more useful than others. For instance, Psychological Flexibility

(PF), the ability to reduce the automaticity of behaviour (e.g., avoidance) in relation to private events (e.g., anxiety), has been shown in two studies (Tyndall et al., 2018; Waldeck et al., 2017) to moderate the distress felt by those who experience ostracism: at low levels of PF, ostracised individuals felt greater distress. Interventions to increase psychological flexibility can employ a range of therapeutic processes, but most such interventions include acceptance and values clarification (AV) exercises, as these are central to the development of PF (Kashdan et al., 2020). In this context, acceptance is often defined as "the voluntary adoption of an intentionally open, receptive, flexible, and non-judgmental posture with respect to moment-to-moment experience" (Hayes, Strosahl, & Wilson, 2012, p. 272) and values clarification as a process through which the individual discovers and labels patterns in their own behaviour which result in appetitive consequences (see Wilson & DuFrene, 2009).

Acceptability of brief interventions

We conclude from the above that there is a pressing need for effective interventions to alleviate ostracism in student populations, particularly in the context of current social restrictions imposed due to COVID-19. Yet, novel interventions which do not consider issues of acceptability and feasibility of delivery within services are unlikely to be readily adopted. Student support services are not often staffed by CBT therapists or clinical psychologists (cf. Gallagher, 2008), suggesting that novel interventions may need to be deliverable by those who are not experts in cognitive behavioural processes. Interventions should also be scalable, as the increasing need for mental health services at universities does not usually result in a proportional increase in staffing, leading to staff burnout and students not getting the help they may need (Gallagher, 2008). Further, due to the time constraints faced by staff of frontline services who may only have a single session with which to make an impact (Strosahl et al., 2012), novel interventions should be designed to be effective yet brief.

Assessing which therapeutic processes maximise salutary effects within a limited time period is therefore of interest for client-facing staff working under time constraints.

Strosahl, Robinson, and Gustavsson (2012) suggest that brief but intensive AV-based interventions could bring about meaningful behaviour change, with initial studies supporting this hypothesis (Bach et al., 2012; Gaudiano et al., 2013; Ruiz et al., 2020; Waters et al., 2018). Brief processed-based interventions are also deliverable in a coaching format (cf. Hulbert-Williams et al., 2016) which might help to destigmatise the intervention amongst some groups (McKelley & Rochlen, 2010), and hopefully increase its acceptability when rolling out to frontline services. Brief AV-based interventions have also previously shown some promise when implemented by non-experts (e.g. Hulbert-Williams et al., 2019) making them a candidate for mitigating the effects of social ostracism in a student population. Indeed, a good many studies testing out AV-based interventions have in fact implemented its theoretical model as a training package, e.g. in an occupational setting, rather than as a therapeutic approach (Archer, 2018; Hayes et al., 2004; Moran, 2011). AV-based interventions differ from thought challenging, cognitive restructuring, and relaxation (CRR) processes common to traditional forms of Cognitive Behavioural Therapy in that the content of thoughts, beliefs, and interpretations is not targeted directly (Bond & Dryden, 2008). CCR-based techniques aim focus on changing cognitions and behavioral responses to cognitions to directly reduce distress (Arch & Craske, 2008). Instead, AV interventions attempts to change the behaviours which *follow* any troubling beliefs (Hayes et al., 2012).Though they can reduce negative psychological outcomes such as anxiety and stress overtime, this is achieved by redirecting behaviour towards one's values (Arch & Craske, 2008). As such one would not expect an AV-based intervention, particularly a brief intervention, to induce reductions in anxiety. Whilst interventions based on cognitive restructuring benefits from a sound evidence base (Emmelkamp et al., 1985; Mattick et al., 1989), some reviews suggest that AV interventions may be as potent for some types of client issues (A-Tjak et al., 2015).

The present study

The present study aims to compare three ultra-brief manualised, non-expert-delivered interventions aiming to promote social resilience (I.e., willingness to persevere with social interactions) despite experiencing social anxiety induced via an experimental ostracism task. We adopted a single-blind randomised controlled trial format, comparing our ultra-brief interventions — one based on the principles of AV and another on the principles of CRR — and a psycho-educational and progressive muscle relaxation (PE-PMR) control condition. Progressive muscle relaxation is an intervention targeting stress-reduction by way of focusing on contrasting sensations of tension and relaxation while systematically and iteratively tensing and relaxing muscles groups (Jacobson, 1929). Although this is a lab-based study, designed to ensure experimental control, we have attempted to mimic several of the practical and logistical constraints faced by university counselling services to increase the external validity of our findings. As is often the case in such settings, we selected a handful of brief intervention techniques, based on the established theoretical bases of these intervention approaches, and which could be delivered within a 1-hour intervention session.

We adopted Cyberball (Williams & Jarvis, 2006), a computerised ball tossing game as our experimental task, which is effective for inducing subjective feelings of ostracism (d > 1.4) according to a meta-analysis of over 120 studies (Hartgerink et al., 2015). To ensure our experimental manipulation was successful, we aimed to measure the effects of Cyberball both by way of self-report and psycho-physiologically. Specifically, we hypothesised, that:

i. Participants in the AV condition will report increases in likelihood to engage (behavioral intentions) in social scenarios compared to participants in the CRR-based and PE-PMR condition.

ii. Participants in the CRR-based intervention will show reduction in anxiety towards the social scenarios compared to participants in the AV and PE-PMR intervention. (Short-term symptom reduction is not an aim of Acceptance-based interventions.)

iii. Participants in both AV- and CRR-based conditions will be significantly more likely to report wanting to play Cyberball again than those in the PE-PMR condition.

Method

Design and Interventions

A randomised (2 [time] x 3 [condition]) single-blind controlled experiment was conducted. Participants were randomly allocated to a novel ultra-brief protocol based on either: (i) Acceptance and values-based intervention (AV), (ii) thought challenging, cognitive restructuring and relaxation, (CRR) or (iii) psycho-educational and progressive muscle relaxation (PE-PMR) condition. Randomisation was achieved using the Microsoft Excel RAND() function. Each intervention condition was delivered using standardised intervention manuals and participant workbooks by a postgraduate psychology student with, at the time, no coaching experience (author SA). All intervention conditions were delivered in a single one-hour session. Intervention manuals and client workbooks are available on the OSF: https://bit.ly/35KUcEd

The *AV-based* intervention provides: (a) context for the need to engage socially (creative hopelessness via “swimming to shore” metaphor) and subsequently asked participants to think about (b) their values (compass metaphor followed by exercise “writing your autobiography”). A short exercise to demonstrate the (c) paradoxical effects of thought suppression (“don’t think of a puppy”) preceded (d) a mindfulness exercise designed to expose participants to eye contact (“eyes on”) – key for social interactions. Participants were then taught (e) defusion of difficult thoughts using imagined audition using the voice of a popular cartoon character. The coach then (f) fostered an acceptance mind-set during difficult social situations with the use of two bespoke metaphors ("Everyone's a little bit Marmite", and "Feeling like a burden at a party"). To finish, participants engaged in (g) a behavioural metaphor “Between a rock & a hard place" designed to foster cooperation.

The *CRR-based* intervention began by contextualising common difficult thoughts in social situations and asked participants to (a) recognise, challenge and rebalance their own biased thoughts, regarding social interactions by following a set of concrete tasks.

Participants then engaged in (b) guided imagery of the social situation followed by thought challenging and rebalancing (with two of their own thoughts). Subsequently, (c) relaxation and centring with diaphragmatic breathing techniques were practised, (d) specific, measurable achievable, relevant and time-bound goals were set regarding future social interactions, and (e) imagery rehearsal of set goals was performed. The intervention ended with, (f) grounding techniques through sensory and cognitive awareness.

We also included a plausible active *PE-PMR control* intervention which involved (a) a mix of didactic and discussion-based psycho-education on social stress, providing an overview of its prevalence, physical and cognitive symptoms, specific thoughts common during stressful social interactions, and common situations which lead to social stress). Further, participants were coached through (b) psycho-education on the human need for social contact, and (c) progressive muscle relaxation techniques. Participants were also provided with information on (d) mental health hygiene (recommendations regarding sleep, exercise, alcohol and caffeine consumptions, and the benefits of belonging to a social group). To end the session, the coach provided (e) social skills training (making conversation), and practiced (f) methods for improving body language (posture and eye contact during social interactions). Based on piloting, control interventions based solely on psycho-education were identified by participants as being a placebo control condition. Progressive muscle relaxation was incorporated to our control condition as it increased believability of the condition to maintain the single-blind design of the study.

Participants

To adequately power a mixed design analysis of variance (3×2 ANOVA; 1- β = .80; α = .05) to detect a medium effect size (defined as η^2_{par}=.09), a minimum total sample size of 30 was required. Given the drive throughout psychological research for larger sample sizes (Asendorpf et al., 2013), we aimed to recruit a sample twice as large. Our study was advertised across a UK university campus with assistance from the university's student

support services. We recruited individuals who self-identified as being "not great in social situations". However, the following exclusion criteria were imposed: (i) participants self-reporting use of psycho-active medication for anxiety as medication might affect psychophysiological measures included to assess the effect of the Cyberball paradigm, or (ii) participants who self-reported a diagnosis of any anxiety related disorder. This second exclusion criterion was required as it would have been unethical to administer an as yet untested non-expert delivered intervention with vulnerable people.

Our sample consisted of 60 individuals (71.7% female) aged 18 to 50 years (M = 22.45, SD = 6.60). Participants were naïve to the precise aims of this study. Research credits and £5 were provided as incentive for participation.

Psychometric measures

Depression, Anxiety, and Stress were measured with the 21-item *Depression Anxiety and Stress Scale* (DASS-21; Henry & Crawford, 2005). The DASS is composed of 3 subscales containing seven items each scored from 0 to 3 with higher scores reflecting greater depression, anxiety and stress symptoms. Depression, anxiety, and stress were measured prior to the intervention, allowing us to check for group differences resulting from randomisation. The Cronbach's alpha of subscales for our sample were good: Depression α = .91, Anxiety α = .83, and Stress α = .83.

Participants' existing levels of social support was assessed using the Medical Outcomes Social Support Survey (Sherbourne & Stewart, 1991). The MOS comprises 19 items scored 1 to 5 with higher scores indicative of greater levels of social support. We obtained an overall index of social support to check for group differences resulting from randomisation. Cronbach's alpha for our sample was good: α = .91.

Psychological Inflexibility (the absence of psychological flexibility) was assessed with the 7-item *Acceptance and Action Questionnaire II* (AAQ-II; Bond et al., 2011). Scores range from 7 to 49 with high scores indicative of greater psychological inflexibility. Psychological

flexibility putatively drives behaviour change in the ACT model, thus, measuring a change in inflexibility was intended as an extra check on the model fidelity of our intervention analogues. The Cronbach's alpha for this sample at T1 was α = .87, and α = .90 at T2.

Thwarted belongingness was measured with the Interpersonal Needs Questionnaire – 10 (*INQ-10;* Bryan, 2010). The INQ-10 is composed of two 5-item subscales measuring perceived burdensomeness and thwarted belonging. The thwarted belonging subscale allowed for us to assess the impact of participating in Cyberball on participants' sense of belonging. At Time 1, participants were asked to base their answers on their feelings "in the last week", whilst at time 2 participants were asked to "base [their] responses on during and following playing the game". Greater scores are indicative of one's sense of belonging being thwarted. Cronbach's alphas for our sample were good: α = .81 at Time 1 and α = .79 at Time 2.

We used the Cyberball Four Needs Questionnaire (CFNQ; Zadro et al., 2004) as a manipulation check. This is a twelve-item scale asking participants about their subjective experience of Cyberball (e.g., "I felt somewhat frustrated during the Cyberball game" rated on a scale of 1 [not at all] to 9 [very much so]), with four sub-scales: belonging (α = .50), control (α = .42), self-esteem (α = .61), and meaningful existence (α = .62). Although the subscales had low reliability overall (alphas above are for our sample, and α = .57 for all 12 items), we included it as a manipulation check due to its face validity and regular use in the Cyberball literature.

Three novel Social Scenarios were created following informal discussions with students. These were made to be readily understood and realistic scenarios that did not necessitate complex or lengthy descriptions; (a) If later today I saw a good friend speaking to a group of people I don't know, I would still speak to that good friend, (b) If later today I was feeling down, I would go and speak to a family member or friend, and (c) If later today I was invited to a small get together, I would go. Following each scenario, participants were asked to rate their motivation (1 = I would like to do this, 5 = I would not like to do this), their

anxiety (1 = I would not feel anxious about doing this, 5 = I would feel really anxious about doing this) and their likelihood to disengage (1 = I would definitely do this, 5 = I would definitely not do this). A global score for a *Behavioral Intention* variable was also computed averaging the three 'motivation' and three 'disengagement' social scenario items at each respective time point (Time 1 α = .76; Time 2 α = .82). *Anxiety* was a second outcome variable made up of the three anxiety items from the three vignettes (Time 1 α = .66; Time 2 α = .78).

Technique usage during the Cyberball task was assessed using a 1 (not at all) to 9 (very much so) rating for the question "How much during the Cyberball task did you use the information from the booklet and coaching session?" On task completion, participants were also asked "How much do you want to do Cyberball again?" rated on a −100 (Really don't want to do it again) to +100 (Really want to do it again) scale, providing us with a behavioural intention measure. On completion of the study, participants were also asked to provide a verbal yes or no response to the following: "There's another Cyberball game (just the game) happening next week. I'm not sure exactly what time, but would you be interested in taking part?" providing us with a measurable behaviour of exposure to aversive social situation.

Experimental Manipulation & Physiological Measurements

Cyberball (Williams & Jarvis, 2006) was used as an analogue of an aversive social situation. The online ball tossing game was arranged as a 3-player game, set so that the virtual players would ostracise the participants. Each game was set to last a total of 30 ball tosses. To yield an appropriate aversive experience, temporary deception was used to increase the believability that other players were real (see Procedure). During the game, photos of a Caucasian male and female in their early 20s, which is representative of the majority of students at the institution, were presented as the avatar of the "other player". A pre-programmed message; "Hey!" also appeared in an in-game textbox 1-2 seconds, and the

participant was thrown to twice, once from each player. These “other players” characteristics and settings were selected to increase potential for in-group exclusion.

To allow us to check that our experimental manipulation was experienced as an aversive social interaction, we measured heart rate (HR) and galvanic skin response (GSR), objective proxy measures of psychophysiological stress (Bhoja et al., 2020; Dawson et al., 2007). Baseline and in-game physiological data acquisition was achieved via a BIOPAC MP 150. Signal was acquired using BIOPAC GSR100C GSR EDA Galvanic Skin Response and PPG100C Pulse Plethysmogram modules. The GSR amplifier was calibrated to detect activity in the range of 0-80μS. Data acquisition and reduction was performed on AcqKnowledge 4.4 software. Physiological signals were sampled at 2000Hz for the duration of the paradigm on all data acquisition channels. Heart rate activity was measured using a photo-electric plethysmograph (PPG) placed on the volar surface of the distal phalange of the middle finger. To measure skin conductance level (SCL) and reduce interference between electrode sets, GSR Ag/AgCl electrode cups filled with BIOPAC isotonic paste were placed on the volar surface of the medial phalanges of the index and ring fingers as recommended in Dawson, Schell and Filion (2007).

Procedure

The experimental procedure is summarised in Figure 1. Having registered interest, potential participants were emailed the information sheet for the study 24hrs in advance of agreed study date. A written informed consent procedure was completed upon arrival. All data collection and intervention delivery were completed in a temperature controlled (23°C) laboratory on university premises. Participants completed demographic (age, sex) and Time 1 questionnaires (AAQ-II, DASS-21, MOS, INQ-10, and social scenarios) and were then randomized to one of the three 1hr intervention conditions, delivered by the research assistant (SA). On completion of the intervention, GSR electrodes and PPG were attached to the participant, and a 5mins baseline of psychophysiological measures were obtained.

Subsequently, as part of the deception to increase the believability of the Cyberball manipulation, the researcher, (i) took a photo of the participant and "uploaded it" to be visible to other players, (ii) made a fictitious phone call to another researcher supposedly present with other participants stating that they were ready to play Cyberball. Following the deception, the participant played Cyberball with concurrent psychophysiological recordings. Having completed Cyberball, electrodes were removed, and participants completed manipulation check measurements and time 2 measurements (desire to play Cyberball again, asked if they would sign-up to a fictitious second iteration of the Cyberball game, AAQ-II, INQ-10, social scenarios). On completion of the time 2 questionnaire, participation incentives were awarded and provided with a written and verbal debrief with contact details of relevant support groups. In addition, participants randomised to the control intervention were provided with the manuals for the other experimental conditions.

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Data Preparation & Statistical analysis

Psychophysiological data. We subtracted the amplitudes of SCRs from the tonic signal (Boucsein et al., 2012), providing a cleaner representation of the tonic SCL signal, yielding cleaned baseline and Cyberball phase SCL signals. We collected baseline and test phase signals which allowed for the baseline signal to be subtracted from the test phase signal so that the resultant SCL measure was a relative difference across manipulations (within each individual). A baseline and Cyberball signal were also obtained for HR to allow us to check for relative differences across manipulations.

Normality and homogeneity of variance checks on SCL data indicated violations of assumptions and a significant positive skew (*z-skew* >1.96). Square root transformation was applied for baseline and test data, normalising the distribution to within acceptable limits. Similarly, normality and homogeneity of variance checks on HR data indicated violations of assumptions and a significant positive skew (*z-skew* >1.96). A reciprocal transformation was

applied, due to the non-zero nature of the HR data at baseline and during Cyberball, normalising the distribution.

Parametric assumptions of homogeneity of variance and normal distributions were assessed. Randomisation checks were performed via one-way ANOVA comparing mean scores by condition at Time 1 on depression, anxiety, stress, social support index, thwarted belonging and psychological inflexibility. This allowed us to establish if groups were comparable and decide if subsequent analyses would require the addition of covariates.

Manipulation checks were performed via 2 (Time) × 3 (Condition) mixed ANOVAs comparing mean heart rate (bpm) and SCL (μS) at baseline and during Cyberball between intervention conditions. Similarly, the impact of Cyberball on thwarted belonging from Time 1 to Time 2 between conditions was assessed. Comparisons were performed for cleaned (in accordance with guidelines provided by Boucsein et al., 2012) and non-cleaned data to ensure cleaning had not overcorrected the physiological signal. As a further manipulation check, we tested the effects of Time and Condition on Psychological Inflexibility as measured using the AAQ-II.

To test our hypotheses, two separate 2 × 3 mixed ANOVAs were performed investigating the time (Time 1 vs. Time 2), Condition (CRR vs. AV vs. PE-PMR), and Time × Condition interactions effects on social scenario scores (Anxiety and Behavioral Intentions). Additionally, two planned contrasts were performed. The first compared estimated marginal means over time on behavioral intentions in relation to social scenarios for AV-based versus CRR-based and PE-PMR control interventions. The second compared CRR-based versus AV-based and PE-PMR control interventions on anxiety towards social scenarios. A one-way ANOVA was performed to assess differences between conditions on desire to play Cyberball again. A Chi-squared test was also performed assessing associations between conditions and participants signing up for a fictitious follow-up Cyberball study.

Analyses testing hypotheses were re-run discounting participants who reported making no use of the coached techniques during the Cyberball task. Although this potentially reduced statistical power, it minimises the likelihood that any observed effects might be driven by confounding variables rather than by the intervention techniques and allows us to establish the efficacy of the interventions separate from questions of engagement.

Results

Randomisation Checks

Means, standard deviations for randomisation checks are provided in Table 1. Parametric assumptions of homogeneity of variance for one-way ANOVA tested via Levene's test were non-significant for all ANOVAs presently reported.

[INSERT TABLE 1. Randomisation checks]

Our results indicate appropriate randomisation was achieved; no significant differences were obtained between conditions on any of the Time 1 variables.

Cyberball Manipulation Checks

Manipulation checks assessing the impact of Cyberball on participants are reported in Table 2.

[INSERT TABLE 2. Manipulation checks]

There was an increase in Thwarted Belongingness across all conditions (Time 1 to Time 2). Similarly, physiological measures of arousal (HR and SCL) increased from baseline to the assessment conducted during Cyberball independent of Condition. The CFNQ measuring subjective affect after the Cyberball game showed no effect of Condition on any of its four subscales. This suggests that the Cyberball manipulation was an aversive experience for participants, independent of Condition as corroborated by the patterns on self-report measures and objective proxy measures of psychophysiological stress.

Descriptive Statistics and Hypothesis Testing

Participant scores on the social scenarios for Time 1 and Time 2 are reported in Table 3 with inferential tests comparing the effect of the interventions. Included are results for participants reporting having made use of the intervention techniques coached earlier, and for the full sample.

[INSERT TABLE 3. Hypothesis testing]

As seen in Table 3, there was a Time × Condition effect on Behavioral Intentions, so we conducted post-hoc simple comparisons. Our findings suggest that, in the brief AV-based condition, Behavioral Intentions changed from Time 1 (M = 2.56, CI = [2.09-3.02]) to Time 2 (M = 2.11, CI = [1.64-2.57], p = .003) with a lower Time 2 score indicating that the brief AV-based intervention helped to improve intentions to seek out social support after experiencing social ostracism. All other simple comparisons were non-significant. When comparing the effects of AV to the effects of the other two conditions combined, using Morris' (2008) guidelines, there was a medium overall effect of the brief AV-based intervention on Behavioral Intentions (d_{ppc2} = .57).

Looking more specifically at the sub-section of our sample who self-reported as being technique users, there was a Time × Condition effect on Anxiety. However, simple effects analyses were all non-significant after performing the appropriate Bonferroni corrections. Finally, there was no Time × Condition effect on Behavioral Intentions (p = .058). However, an exploratory post-hoc test revealed that, in the AV condition only, Behavioral Intent was lower (lower scores signal improvements) at Time 2 (M = 1.61, SD =.46, CI = [1.17-2.04]) compared to Time 1 (M = 2.21, SD =1.01, CI = [1.78-2.65], p = .006), with a large effect (d_{ppc2} = .64).

As seen in Tables 1 to 3, the AV condition appeared to have slightly higher distress scores than the other conditions, albeit non-significantly so. For this reason, we re-ran the above tests while controlling for total DASS scores. The results are presented in Table 4. Simple comparisons when adjusting for DASS scored followed our previously reported pattern of findings. Improved Behavioral Intentions (Time 1 M_{adj} = 2.56, CI = [2.09-3.02], and Time 2 M_{adj} = 2.11, CI = [1.64-2.57], p=.003), were observed for AV. All other simple effects remained non-significant.

[INSERT TABLE 4. ANCOVA controlling for DASS]

The effect of AV is thought to come about through changes in psychological flexibility, allowing participants to pursue valued actions. Therefore, we tested the effect of Time and Condition on Psychological Inflexibility. However, although there was a main effect of Time ($M_{Time\ 1}$ = 22.12, $M_{Time\ 2}$ = 19.73; F[1, 57] = 16.47, p<.001, η^2_{par} = .22, 1-β = .98) on Psychological Inflexibility, this did not interact with Condition. An exploratory 3-way mixed ANOVA (2 [time] × 3 [condition] × 2 [median split high/low Time 1 psychological inflexibility]) was conducted to explore if baseline levels of psychological inflexibility impacted on our outcome variables. A 3-way interaction effect was observed (F[2,54] = 3.24, p = .047, η^2_{par} = .11) on Behavioural Intention (see Figure 2), indicating that participants with high levels on inflexibility benefited (lower scores indicate improvements) the most from AV and CRR interventions compared to PE-PMR, though AV and CRR did not differ. Conversely, those with low levels of inflexibility from the start of the study did not seem to significantly benefit from any of the interventions. This pattern was not observed for Anxiety (F[2,54] = .04, p = .963, η^2_{par} = .00).

[Insert figure 2]

A one-way ANOVA found that there was no effect of Condition on desire to play Cyberball again (F[2, 57] = .04, p > .05 , η^2_{par} = .001). A Chi-square test was used to assess associations between Condition and whether participants would sign up for a fictitious follow-up Cyberball study, also finding null results (χ^2[2] = .62, p >.05, Φc= .10). Therefore Hypothesis 3 was rejected.

Discussion

This study aimed to test whether a brief, non-expert-delivered acceptance and values based (AV-based) intervention could help to mitigate the effects of social ostracism in a student sample by increasing social resilience. Importantly for our aim of testing social resilience, our manipulation checks confirmed that participants had experienced Cyberball as an aversive social situation as corroborated by increases in self-reported measure of Thwarted Belonging and psychophysiological measures of stress. Hypothesis 1 was supported. Overall, Behavioral Intention was improved by the AV-based intervention. Yet as expected, we found that the brief AV-based intervention did not reduce Anxiety experienced. This is consistent with the claims surrounding AV-based interventions as they aim to reduce the negative psychological outcomes of anxiety and stress by redirecting our behaviour towards what is important to us, as opposed to trying to reduce the subjective experience of anxiety and stress in the short term. The effect of the ultra-brief AV-based intervention compared to cognitive restructuring (CRR-based) and psycho-education/progressive muscle relaxation (PE-PMR) interventions, using a relatively conservative effect size estimate (Morris, 2008), on Behavioral Intention was surprising in its magnitude (d_{ppc2} = .57) considering the low dosage (1 hour). This medium effect size is notable for an ultra-brief intervention given that (i) other randomised controlled trials of AV-based interventions have typically only found a small effect at best (Öst, 2014; though this includes a mixture of brief and full-length trials) and (ii) AV-based interventions are not typically found to be more efficacious than CRR-based interventions (A-Tjak et al., 2015). However, data from the current study suggests that it may be the case that AV-based techniques are more useful than CRR-based techniques in the context of ostracism, as acceptance changes how we relate to negative emotions but does not try to reduce symptoms of negative emotions. Further work will be needed to demonstrate this conclusively. This is supported by our data testing Hypothesis 2; there was no effect of

Condition × Time on Anxiety indicating that the brief CRR-based intervention did not reduce the symptoms of anxiety as might be expected from a full course of CBT (Öst, 2014).

There was no association between wanting to play Cyberball again and Condition, rejecting our third hypothesis. Our manipulation check showed that Cyberball was universally considered to be aversive; psychophysiological analyses suggest that Cyberball did induce a notable arousal response and increased thwarted belonging. However, in the AV condition only, participants appeared not to let this affect their self-reported intention to socially disengage as much as in the CRR and PE-PMR conditions. Both the physiological data and self-report social scenario data appeared to suggest that participants experienced Cyberball as socially aversive. Across all conditions, most participants did not want to play again. Those in the brief AV-based condition nonetheless reported more willingness to engage in other potentially distressing social scenarios. These findings are broadly consistent with the core aims of AV-based interventions (e.g., ACT) *not* to reduce distressing thoughts and feelings in the short-term, but *to* enable clients to pursue valued action despite distressing thoughts and feelings which may arise.

Other aspects of our results were consistent with AV-based intervention theory, which does not seek to get rid of negative experiences, but to increase valued action when negative experiences occur. In this study, even though self-reported Behavioral Intentions were improved in the ultra-brief AV condition, as expected, this did not coincide with a lowering of self-reported social Anxiety. Consequently, ultra-brief AV may be useful for decreasing avoidant responses to short-term aversive psychological events. It follows that long-term AV may be useful for changing such psychological traits (Roberts et al., 2017) rather than states. This may be important for coping with aversive experience in the natural environment in the long term (Segerstrom & Smith, 2019).

Mechanisms of action

Though our data did not directly show the mechanism through which ultra-brief AV mitigated self-reported Behavioral Intentions, there was an overall reduction in Psychological Inflexibility from Time 1 to Time 2 that, importantly, was *not* dependent on Condition (AV vs CRR vs PE-PMR). Yet, it was only those in the brief AV-based condition who had significantly lower Behavioral Intention scores at Time 2. Conversely, our exploratory analysis indicates that those with high baseline Psychological Inflexibility benefited most from brief AV and CRR interventions (see Figure 2). In retrospect, considering recent arguments suggesting that the AAQ-II may measure a trait-like construct (e.g., Rochefort et al., 2018; Tyndall et al., 2019), the AAQ-II might reasonably be expected not to pick up on state changes due to brief interventions. However, AAQ-II scores *did* change over time, as might be expected of a state measure, though it does not appear to be due to any distinguishing features of any of our interventions. It is unclear to us whether this might reflect a mere practice effect.

Future research on the mechanism of action in AV-based brief interventions and confirmation of the findings of our exploratory analysis is warranted. This might entail looking at more specific *components* of Psychological Inflexibility, such as value clarity or state mindfulness. Changes in these components might be more easily measured following brief interventions. Alternatively, larger samples with greater variation in Psychological Inflexibility (insofar as it can be measured) may determine the threshold at which brief interventions are no longer effective (e.g., for those experiencing distress yet exhibiting low levels of inflexibility).

Strengths and limitations of the current study

Ultra-brief AV-based interventions for non-clinical issues (e.g., perceived ostracism, food cravings [Hulbert-Williams et al., 2019]) have previously been shown to feasibly be delivered within a single session and by non-experts. This may be especially useful for

university counselling centres for which the demand often exceeds resources (Gallagher, 2008). However, in the present study, 58.33% (*n*=35) of our sample indicated using the techniques during the aversive social experience[*]. The results of the sub-sample analysis were consistent with those of the full sample in terms of the efficacy of the interventions. Yet the lack of usage by 41.66% of participants suggests further work will be needed to provide a more persuasive rationale for the adoption of these techniques. It is also possible that fluency in the technique was low for these participants and an increased dosage could be beneficial. At present, we are unable to say why some participants used the techniques, while others chose not to. Though exploratory analyses show this not to be significantly associated with baseline levels of psychological inflexibility[†]. Future research may wish to incorporate a qualitative component to enquire as to why some participant did or did not employ the techniques.

The validity of the results of this study are limited by the self-report measures of Behavioral Intention, rather than measuring participants' behavior, a limitation which is common to randomized controlled trials. Nonetheless, social scenarios that accounted for participants' present context (e.g., "if later today I…") were used to increase the contextual and ecological validity of this study. This arguably increases the validity of our study relative to brief intervention studies that use conventional context-independent questionnaires as dependent variables. Nonetheless, it remains that our study is limited to the reporting of behavioral intentions, limiting conclusions with regards to behavior. Therefore, we recommend future research to directly measure social engagement behaviors to address this knowledge gap. The interventions (AV, CRR, and PE-PMR) were implemented in a controlled lab setting as a test of principle for the techniques. Generalizability of these results

[*] Chi-square analysis revealed there to be no associations between conditions and self-reported use of techniques ($\chi^2[2] = 4.36$, $p = .113$) on wishing to play Cyberball again.
[†] Nor any association between self-report use of techniques and Psychological inflexibility (median split into high/low) ($\chi^2[1] = 0.00$, $p = .965$)

will of course be limited by factors such as setting or dose. The randomised active-controlled trial format was a strength of this study, as this design is often considered to be "gold standard" for testing clinical interventions (Kaptchuk, 2001). Therefore, these data suggest some utility in ultra-brief AV-based approaches for universities to trial in student support settings where there are considerable time constraints. However, we cannot rule out that some of our findings might be false positives or false negatives, so replication in larger samples is encouraged.

General applicability of brief interventions

Social engagement can buffer against adverse psychological outcomes (Fasihi Harandi et al., 2017; Sandstrom & Dunn, 2014; Uchino et al., 2018). Therefore, similar brief interventions could tentatively be useful in contexts beyond ostracism. For instance, as an early intervention for socially isolated students, of whom there are many (Peel, 2000), before they present with mental health difficulties to counselling services, or while they are waiting for counselling. However, we must remain cautious. Brief interventions, particularly AV-based ones are no panacea and further exploration as to the limits of their usefulness are recommended. For instance, there was no Time × Condition interaction effect on Thwarted Belongingness (Table 2), indicating that our interventions did not directly reduce thwarted belonging. Given that belonging is a cognitive appraisal of previous social interactions, such a change was not expected due to our ultra-brief AV-based intervention. However, maintaining social engagement via ultra-brief AV interventions, for those who are ostracised, could facilitate opportunities to increase feelings of belongingness. This might in turn help to mitigate against adverse psychological outcomes of low belongingness such as lower well-being (Arslan, 2018) or self-esteem (Zadro et al., 2004), and maladaptive coping mechanisms such as drinking (Bacon & Engerman, 2018) or suicidality (Van Orden et al., 2010). However, data corroborating this suggestion are required.

Promoting social resilience when prevention is not possible

Social adjustment difficulties might be seen as inevitable given that ostracism can be exacerbated by temperamental psychological differences (e.g., introversion; Ren et al., 2016) which may require longer-term therapy to change (cf. Roberts et al., 2017) especially given that these individual differences substantively reflect biological dispositions (Vukasovic & Bratko, 2015). Given that we can neither control others' behaviour nor our own baseline feelings of negative emotion relative to others, it is not likely that we will be able to eradicate feelings of social ostracism; these feelings are not exclusively caused by systematic environmental factors that one might seek to control. Whilst some interpersonal variation in negative affect is inevitable, brief AV-based interventions may be useful for helping the student population to cope (specifically by staying socially engaged) whenever they do feel ostracised. This is supported by the findings of our ANCOVA which demonstrated the AV-based intervention to improve Behavioral Intentions while controlling for depression, anxiety, and stress scores.

Conclusion

To conclude, our results indicate that ultra-brief AV may be useful not for reducing social anxiety experienced by students when ostracised, but for helping them to continue seeking out social engagement despite being ostracised. Furthermore, as ultra-brief AV can be delivered by non-specialists, this kind of intervention may be useful for student support services who are typically not staffed by clinical psychologists. Given the current data, and the new but growing literature on ultra-brief acceptance and values interventions (Brandrick et al., 2020; Hulbert-Williams et al., 2019) we tentatively suggest that such interventions might be useful in a range of settings. As yet, we know of no conclusive evidence upon which to assess the dose-response relationship and it should be kept in mind that brief — but not ultra-brief — interventions may hold even more promise (Kroska et al., 2020). We would particularly encourage those involved in student welfare to consider this approach, especially

given the increase in social isolation owing to the current Covid-19 pandemic which has led to a worsening of mental health especially among younger adults (Office for National Statistics, 2020).

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Table 1. Descriptive statistics and one-way ANOVA for randomisation checks (N= 60)

	AV (*n*=19)		CRR (*n*=20)		PE (*n*=21)		Main Effect of Condition	
Time 1	*Mean*	*SD*	*Mean*	*SD*	*Mean*	*SD*	η^2_{par}	*p*
DASS Depression	5.16	4.86	3.90	3.73	4.81	3.94	0.02	0.625
DASS Anxiety	6.79	3.88	5.40	4.45	3.76	3.60	0.09	0.064
DASS Stress	8.89	4.92	7.50	4.31	6.62	3.88	0.05	0.264
Social Support index	3.89	0.76	4.13	0.95	3.77	0.86	0.03	0.421
Thwarted Belonging	3.29	1.66	2.81	1.01	3.49	1.26	0.05	0.255
Psychological inflexibility	24.42	9.37	21.50	8.43	20.43	8.36	0.04	0.338

Table 2. Descriptive statistics, one-way ANOVAs and mixed 2×3 ANOVAs for Cyberball manipulation checks (N= 60)

	AV (*n*=19)		CRR (*n*=20)		PE-PMR (*n*=21)		Main Effect of Condition		Main Effect of Time		Time × Condition Interaction	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	η^2_{par}	*p*	η^2_{par}	*p*	η^2_{par}	*p*
Cyberball 4 needs												
Belong	5.23	1.23	4.77	1.37	5.00	1.48	0.02	0.578	-	-	-	-
Control	3.75	1.54	3.13	1.47	3.10	1.58	0.04	0.328	-	-	-	-
Self-esteem	4.41	1.52	4.87	1.44	4.57	1.18	0.02	0.583	-	-	-	-
Meaning	4.70	2.07	4.53	2.24	5.37	1.97	0.03	0.427	-	-	-	-
Thwarted Belongingness												
Pre- (Time 1)	3.29	1.66	2.81	1.01	3.49	1.26	0.05	0.237	0.09	0.024	0.027	0.461
Post- (Time 2)	3.83	1.63	3.09	1.28	3.61	1.43						
***Heart rate (bpm)**												
Baseline	80.60	20.68	77.34	22.04	74.29	10.07	0.01	0.711	0.09	0.022	0.041	0.306
Cyberball	81.83	18.09	78.66	23.14	78.84	13.92						
***Skin Conductance Level (µS)**												
Baseline	4.16	1.88	3.63	2.20	3.40	1.61	0.02	0.609	0.42	<.001	0.027	0.454
Cyberball	4.78	1.94	4.26	2.93	4.33	1.77						

**Untransformed data are reported here. The transformed data showed a similar pattern of results.*

Table 3 - Social Scenario scores pre- and post-Cyberball for full sample (n=60) and self-reported technique users (n=35)

	AV (*n*=19)		CRR (*n*=20)		PE-PMR (*n*=21)		Main Effect of Condition		Main Effect of Time		Time × Condition Interaction	
	Mean	*SD*	*Mean*	*SD*	*Mean*	*SD*	η^2_{par}	*p*	η^2_{par}	*p*	η^2_{par}	*p*
Full sample												
Anxiety												
Pre- (Time 1)	2.67	0.96	2.32	0.93	2.52	1.22	0.02	0.554	0.02	0.360	0.03	0.418
Post- (Time 2)	2.44	0.85	2.20	1.01	2.60	1.32						
Behavioral Intention												
Pre- (Time 1)	2.29	0.87	2.04	0.74	1.87	0.70	0.00	0.867	0.06	0.068	0.13	0.017
Post- (Time 2)	1.85	0.67	1.89	0.82	2.02	1.15						
***Self-reported technique users**	(*n* = 11)		(*n*=15)		(*n*=9)							
Anxiety												
Pre- (Time 1)	2.76	1.00	2.36	0.97	2.19	1.18	0.03	0.637	0.04	0.273	0.18	0.045
Post- (Time 2)	2.45	0.95	2.09	1.00	2.44	1.36						
Behavioral Intention												
Pre- (Time 1)	2.21	1.02	2.06	0.78	1.76	0.61	0.00	0.933	0.10	0.069	0.16	0.058
Post- (Time 2)	1.61	0.46	1.86	0.87	1.91	1.18						

**individuals scoring ≥3 on self-report technique use during the study.*

Table 4. 2x3 Mixed ANCOVA on social scenarios controlling for DASS scores for full sample (n=60) and self-reported technique users (n=35)

	Main Effect of Condition		Main Effect of Time		Main effect of Covariate		Time × Condition Interaction	
	η^2_{par}	*p*	η^2_{par}	*p*	η^2_{par}	*p*	η^2_{par}	*p*
Full sample								
Social scenario - Anxiety	0.03	0.447	0.00	0.599	0.16	0.002	0.02	0.564
Behavioral Intention	0.00	0.993	0.03	0.185	0.06	0.058	0.14	0.016
***Self-reported technique users**								
Social scenario - Anxiety	0.02	0.693	0.00	0.731	0.25	0.003	0.16	0.073
Behavioral Intention	0.02	0.711	0.10	0.069	0.22	0.006	0.19	0.037

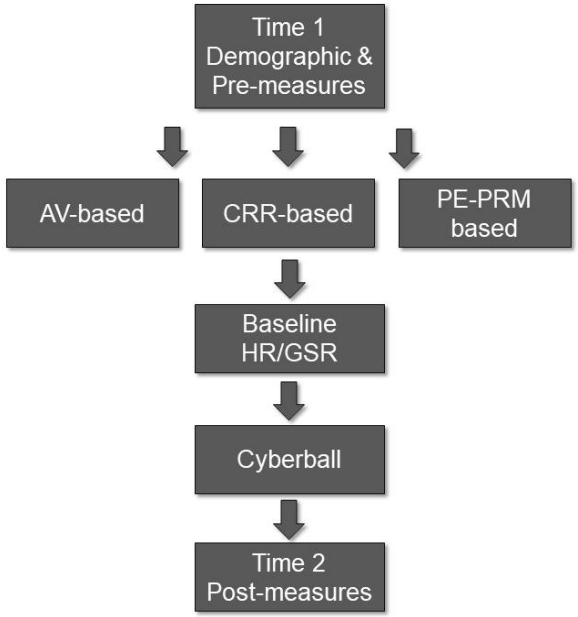

Figure 1 - The study procedure

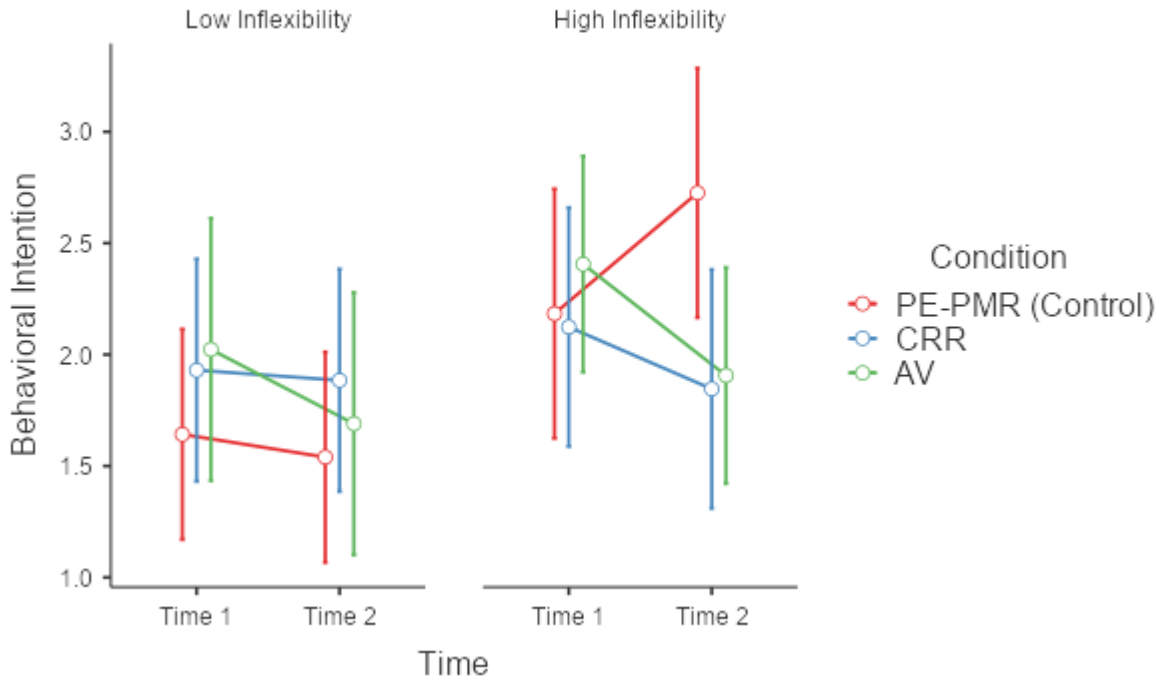

Figure 2 - Results of exploratory Mixed ANOVA (2[Time] x 3 [Condition] x 2 [high/low Psych Inflex]) with 95% CI