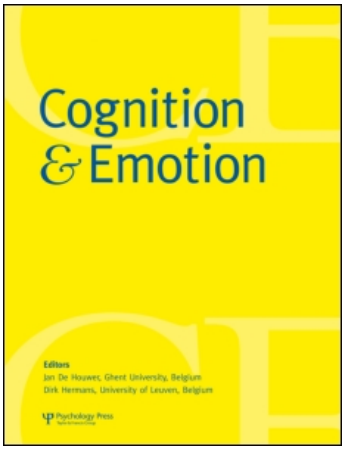

Cognition & Emotion
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713682755

Computer game associating self-concept to images of acceptance can reduce adolescents' aggressiveness in response to social rejection

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First published on: 22 July 2009

To cite this Article Baldwin, Mark W. , Baccus, Jodene R. and Milyavskaya, Marina(2010) 'Computer game associating self-concept to images of acceptance can reduce adolescents' aggressiveness in response to social rejection', Cognition & Emotion, 24: 5, 855 — 862, First published on: 22 July 2009 (iFirst)
To link to this Article: DOI: 10.1080/02699930902884386
URL: http://dx.doi.org/10.1080/02699930902884386

COGNITION AND EMOTION
2010, 24 (5), 855–862

Psychology Press
Taylor & Francis Group

BRIEF REPORT

Computer game associating self-concept to images of acceptance can reduce adolescents' aggressiveness in response to social rejection

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The experience of social rejection can lead to an aggressive response. However, the ability to maintain a sense of social connection may reduce the likelihood of this type of response. We tested a computer-based intervention designed to use simple learning principles to boost the sense of social connection and acceptance. Adolescents aged 9–15 ($n = 138$) first completed a conditioning game on computer that repeatedly paired their own name with images of social acceptance (versus a control condition with no systematic pairing), and subsequently reported how aggressively they would behave in response to being rejected by a peer. Those completing the self-acceptance conditioning (particularly those low in self-esteem) reported less aggressive feelings and intentions.

Keywords: Self-esteem; Aggression; Rejection; Game; Conditioning.

Aggression and violence constitute a serious problem in North American society (AuCoin, 2005; US Department of Justice, 2008). Childhood and adolescence are particularly crucial times, as aggression in these developmental stages is related to aggression later on in life (e.g., Huesmann, Eron, & Dubow, 2002; Temcheff et al., 2008). In a recent nation-wide study of bullying, 30% of US students in grades 6–10 reported involvement in bullying either as a bully, a victim, or both (Nansel et al., 2001). These adolescents also demonstrated poorer psychosocial adjustment than youth who were not involved in bullying (Nansel et al., 2001). Aggression in adolescence is thus a widespread problem that urgently needs to be addressed. In the current study we explored the impact on aggressiveness of a computer game designed to modify cognitive associations among concepts relating to self and positive social relations.

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The authors gratefully acknowledge financial support from the Social Sciences and Humanities Research Council of Canada. MWB and JRB acknowledge a financial relationship with a commercial entity that has an interest in the subject of this article.

http://www.psypress.com/cogemotion
DOI:10.1080/02699930902884386

Aggression, rejection, and self-esteem

The context of our work is research showing that although aggressive thoughts, feelings, urges, and behaviours among adolescents are undoubtedly multi-determined by a host of chronic and situational factors (see, e.g., Crick & Dodge, 1994; Dodge et al., 2003), one important set of determinants appears to revolve around a subjective sense of *social rejection* versus connection. From the Surgeon General's conclusion that the strongest risk factor for adolescent violence is the absence of social ties (Office of the Surgeon General, 2001) to a sizeable correlational literature linking youth aggression to peer rejection (e.g., Leary, Twenge, & Quinlivan, 2006), to a report that 13 out of 15 American school shooting incidents in the 1990s involved a clear indication of social rejection of the perpetrators before the attacks (Leary, Kowalski, Smith, & Phillips, 2003), there is ample evidence that aggressive urges often arise in response to perceived rejection.

Certainly not all instances of rejection result in aggressive responses, and several lines of research have documented possible moderating factors. One prosocial factor that appears to reduce the link between rejection and aggression is the ability to maintain a subjective sense of social connection—a sense of acceptance or belonging—even in the face of a rejection experience. In a recent study with university students, for example, Twenge et al. (2007) first demonstrated a known experimental finding that people who were told that they had been rejected by other participants, and were then given a chance to administer loud blasts of aversive noise to a stranger in a bogus reaction-time game, acted aggressively by selecting louder and longer blasts of noise than non-rejected control subjects. However, this increased aggression was mitigated in a subset of participants who were instructed to think about their best friends for 2 minutes prior to the reaction-time game. Evidently, activating a mental state of social connection can break the link between rejection and aggression.

A second moderating factor that has been shown to influence aggressiveness is self-esteem, although the direction of the link has been the subject of some debate in the literature. While some researchers have suggested that high self-regard can be linked to higher aggression (e.g., Baumeister, Smart, & Boden, 1996), a closer examination of the evidence shows that high levels of narcissism, and not self-esteem per se, are conducive to aggressiveness (Bushman and Baumeister 1998; Twenge and Campbell, 2003). Meanwhile, studies with adolescent populations have consistently linked low self-esteem with aggression, independently of narcissism (e.g., Barry, Frick, & Killian, 2003; Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005). Additionally, research has shown that people with low self-esteem are particularly affected by social acceptance or rejection (Nezlek, Kowalski, Leary, Blevins, & Holgate, 1997), suggesting that the link between rejection and aggression is particularly strong for people with low self-esteem who may find it difficult to maintain a sense of acceptance in the face of rejection experiences.

Evaluative conditioning of social information processing

In the current study we examined the impact of a recently developed conditioning intervention, designed to foster a sense of social connection, on feelings of aggressiveness after a rejection among children and adolescents with high and low self-esteem. This conditioning intervention, originally tested with university students (see Baccus, Baldwin, & Packer, 2004), consists of a game-like computer task in which the player clicks on words and names appearing in different quadrants on the screen. Each time the player clicks on his or her own name or other self-relevant word (e.g., "I" or "me") a smiling, accepting face appears (see Figure 1). If the target is non-self-relevant (e.g., an unfamiliar name) a neutral or frowning face is displayed instead. As a result of simple conditioning principles, after dozens of trials the player is thought to form an association between "self" and "acceptance",

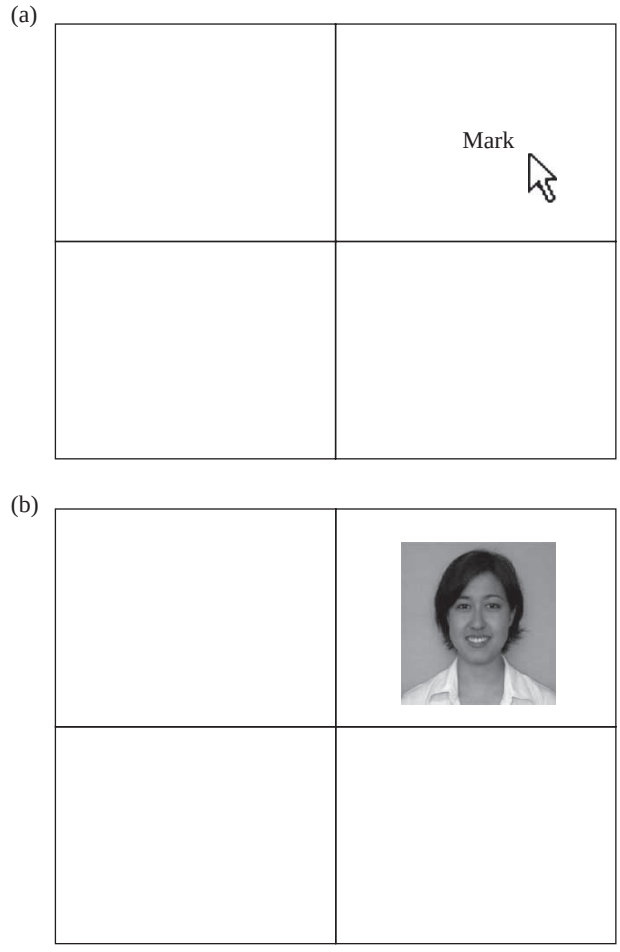

Figure 1. *Self-acceptance conditioning game.* Note*: On each trial the player clicks on the word or name that is shown in one of the quadrants, and the click is followed by a 400 ms display of a smiling, frowning, or neutral face. In the self-acceptance (experimental) version of the game, self-relevant stimuli (including the player's own name or the words "I" or "me") are always followed by a warm, accepting face. In the control version of the game the exact same expressions are shown but they are randomly paired with self-relevant and non-self-relevant stimuli.*

which is hypothesised to boost the sense of positive connection between self and other. Baccus et al. found that compared to a control condition, in which the same stimuli and faces are shown but randomly paired (which should produce no associative learning; see, e.g., De Houwer, Thomas, & Baeyens, 2001), the self-acceptance conditioning had several positive effects including a reduction in aggressiveness. Consistent with other research showing that low self-esteem is related to difficulties in dealing with social rejection (e.g., Nezlek et al., 1997), the aggressiveness findings were particularly pronounced among participants with low self-esteem.

For our current study we sought to replicate the positive effects of this manipulation among a younger sample of participants, while making several changes to the methodology. First, we conducted the study in several different testing contexts, including the classroom and in a week-long summer camp. Second, we presented the conditioning manipulation on handheld PDA

(personal data assistant) computers as well as on desktop units (as in the earlier research). Third, for this younger sample we attempted to select a novel set of faces that appeared relatively young (i.e., in the 16- to 18-year-old range). Our major goal, however, was to determine whether the positive impact of this conditioning game would be evident among a sample of youth aged 9–15. We hypothesised that participants who played the conditioning game would report lower aggressive feelings and behaviour intentions than participants in the control condition, and that this would be especially salient for participants with low self-esteem.

METHOD

Participants

A sample of 138 young people (79 girls) between the ages of 9–15 (mean age = 12.51) participated in this study. The data were collected in four different Montreal-area elementary and middle schools and one-day camp.

Procedure

All participants filled out the Rosenberg self-esteem scale (Rosenberg, 1965) at the beginning of the study. Then they were randomly assigned to perform either the experimental or control version of the conditioning task, which was modified slightly from the version of the task used by Baccus et al. (2004). As demonstrated in Figure 1, experimental participants played a version of the game in which their name and self-relevant words (to examine the generality of the effect, for some subsets of subjects self-relevant information including birth date and hometown, as in the original Baccus et al. research; for other subjects the self-relevant terms "I" and "me" were used instead) were repeatedly paired with an accepting image. Non-self-relevant information was paired with non-smiling faces (again, to examine the generality of the effect, for some subjects the non-smiling faces included frowns and neutral expressions, as in the original Baccus et al. research; for other subjects the non-smiling faces were all simply neutral). Control participants saw the same faces (with the same expressions) as in the experimental condition, but the facial expressions were randomly paired with self-relevant and non-self-relevant stimuli, which would be expected to produce no systematic learning effect. To assess the robustness of the manipulation the conditioning was administered in several formats: Participants completed the conditioning task either on a desktop computer or on a handheld PDA, in either a classroom or a week-long day camp. For approximately half the sample, there was one training session lasting 5–10 minutes, whereas for the remainder of the sample participants played the game for 3–5 minutes daily for a week (before completing the dependent measure of aggressiveness on the final day).

Consistent with previous experimental research, particularly with children (e.g., Nesdale & Lambert, 2007), we measured aggressive thoughts, feelings and urges rather than actual behaviour using a vignette measure (modified from Baccus et al., 2004). Participants were asked to first imagine getting on a school bus where there is only one empty seat, but then upon approaching that seat having the person next to it deliberately put their backpack on the seat so that the participant is not able to sit down. Then, as the vignette continues the participant later takes part in a game where they have the option of blasting the rejecting person with a loud noise. They are asked to rate on four 7-point scales how loud and how long they would feel like setting the noise, and how loud and how long they would actually set the noise. These four responses were summed to give an aggressiveness score (alpha = .77).

RESULTS

Control variables

Preliminary analyses to assess possible effects of gender, age, and testing context (i.e., situation and delivery platform) on the aggressiveness measure

showed only an effect of age, with older children expressing higher levels of aggressiveness, $r(126) = .197$, $p = .026$. Age did not interact with experimental condition, and including age as a control variable in subsequent analyses did not appreciably affect the results. The experimental effect, then, did not interact with the mode of delivery or the specific stimuli used in the training task.

Aggressive thoughts and feelings

An initial analysis of variance showed that, as hypothesised, children completing the experimental version of the game reported feeling significantly less aggressive ($M = 15.15$, $SD = 4.61$) after the social rejection scenario than children completing the control version of the game ($M = 17.06$, $SD = 4.57$), $F(1, 130) = 5.74$, $p = .018$ (*df*s may vary across analyses due to missing data; in particular, 6 participants did not complete the aggressiveness measure). Thus, playing a simple game that repeatedly pairs "self" with "social acceptance" led adolescent participants to report less aggressive urges toward a rejecting other.

We next conducted additional analyses involving self-esteem as a predictor. The original research on this paradigm by Baccus et al. (2004) found that the conditioning effect on aggressiveness interacted with participants' pre-existing levels of self-esteem, so we wished to test this interactive effect in the current adolescent sample. The role of pre-measured self-esteem was particularly important to examine in the current study due to an anomaly in randomisation, in which participants who were randomly assigned to the experimental condition unexpectedly began the study with marginally higher pre-measured self-esteem than those assigned to the control condition; $F(1, 135) = 3.46$, $p = .065$. To examine the independent contribution of self-esteem and experimental condition, thereby ruling out a potential confound that the ostensive experimental effects might have capitalised on pre-existing self-esteem differences, we entered both variables together, along with their interaction, into an analysis of variance (ANOVA). Experimental condition remained a significant predictor of aggressiveness, $F(1, 127) = 5.62$, $p = .019$, in this analysis, and there was neither a significant main effect nor interaction involving pre-measured self-esteem (based on a median split, although similar effects were found in a regression analysis), main effect $F < 1$; interaction $F(1, 127) = 2.24$, $p = .137$. On the strength of the Baccus et al. findings, however, we conducted a more focused analysis by splitting the sample on the basis of their pre-measured self-esteem score. Consistent with those earlier findings, experimental condition significantly reduced aggressiveness among individuals with low self-esteem, $t(63) = 2.80$, $p = .007$, but there was no effect among those with high self-esteem, who already reported relatively low levels of aggressiveness, $t < 1$ (see Figure 2).

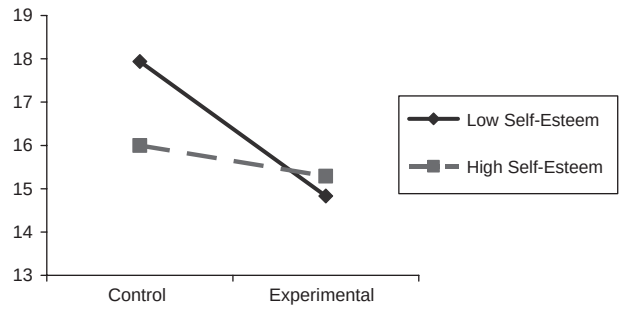

Figure 2. *Aggressiveness scores as a function of experimental condition and pre-measured self-esteem.* Note*: Higher numbers represent higher levels of aggressive feelings and intentions in response to an imagined social rejection.*

DISCUSSION

We found that a simple computer game that pairs the self-concept with images of warm social acceptance can temper adolescents' tendency to react to social rejections with aggressiveness. There was a significant effect for experimental condition, overall, and focused analyses showed that the effect of the conditioning intervention was particularly pronounced among those 9- to 15-year-olds with relatively low self-esteem, who presumably find it most difficult to maintain an emotional sense of secure connection to others when under threat.

There has been some debate in the self-esteem literature about whether low or high self-esteem is more strongly linked to aggression and other externalising problems (see, e.g., Anderson & Bushman, 2002). Several lines of research have clarified this issue, and it seems likely that whereas narcissistic feelings of superiority are indeed linked to aggression, so are low self-esteem feelings—particularly those based on a lack of social acceptance (Barnow, Lucht, & Freyberger, 2005; Donnellan et al., 2005; Kirkpatrick, Waugh, Valencia, & Webster, 2002). In line with the current findings, the link between low self-esteem and aggression does seem to involve issues of insecurity and rejection (e.g., Gomez & McLaren, 2007). Fostering healthy self-regard, then, by increasing the sense of being accepted and included by others, is likely to reduce rather than increase aggressiveness in the long run.

We acknowledge several limitations of our study. Although our primary goal was to replicate the effect of the conditioning procedure on feelings of aggressiveness while extending the research to a sample of adolescents, rather than to do a detailed examination of the cognitive mechanisms involved, some theoretical questions merit consideration. In our earlier research with adults, we tested the possibility that the manipulation might merely have improved mood, which then led to reduced aggressiveness, but found no evidence for this. In some of the current subsamples we did include mood measures (e.g., PANAS; Watson, Clark, & Tellegen, 1988), but found no significant effects involving experimental condition and no evidence that mood mediated the significant conditioning effects on aggressiveness. It is also possible to question whether features of the manipulation other than the pairing of self-concept stimuli with the social acceptance reflected in the smiling faces might have produced the effect. For example, there was a meaningful contingency among stimuli only in the experimental condition, whereas the control condition consisted of random pairings. While we do not see this as a plausible factor in accounting for the findings on aggressiveness (or the results of our earlier research; Baccus et al., 2004), we cannot rule it out given our current design. It is also the case that although we hypothesise that the procedure strengthens a self-acceptance association, our findings (and, indeed, our earlier results showing an effect of increased implicit self-esteem; Baccus et al., 2004) are also consistent with an interpretation focusing on transfer of positive valence, from smiling faces to the self (see De Houwer et al., 2001, for a discussion of evaluative conditioning). Further research is required to tease apart these alternatives, as well as to extend the research to the study of actual behavioural aggression rather than self-reports. Finally, the effect of our experimental procedures, while promising, was not overly large: With a sample size of 132 participants completing the aggressiveness measure, the Cohen's *d* value of the conditioning effect was 0.42, which falls between a small and medium sized effect according to Cohen's guidelines (where 0.20 is a considered small and 0.50 is considered medium; Cohen 1988). The effect of the conditioning did not vary as a function of amount of training (e.g., one session or several sessions across a week), but more research is required to determine if even longer training might produce a larger impact.

Many researchers and educators have examined potential pathways to curb aggression in adolescence. However, a recent review examining school interventions designed to eradicate bullying found that many of the interventions, especially those based on curriculum change, were ineffective in

reducing the amount of bullying (Vreeman & Carroll, 2007). Our study points to reinforcing social acceptance, along with increasing students' self-regard as potential mechanisms that can be used in designing future interventions to reduce bullying.

An especially interesting aspect of our conditioning intervention is its medium. It may seem ironic that computer games—which, after all, have a questionable reputation when it comes to their possible effects on adolescents' aggressive behaviour—might show potential as a positive influence in reducing antisocial impulses. Researchers interested in the possible negative effects of videogames (e.g., Anderson, Gentile, & Buckley, 2007) have developed sophisticated models of the pathways whereby media might negatively modify associations, expectations, and the like, and there is little reason to expect that the same influences might not work in the opposite direction. Indeed, specially designed games are showing promising initial results in such endeavours as teaching surgical techniques and encouraging children with cancer to persist with their treatment regimen (e.g., Bergeron, 2006). In the domain of education, a growing literature has examined the potentials of electronic game-based learning (e.g., Prensky, 2001; Rieber, 1996; Turvey, 2006), and numerous studies have shown video games' potential to modify social cognitive processes (e.g., Dandeneau, Baldwin, Baccus, Sakellaropoulo, & Pruessner, 2007; Greenfield & Cocking, 1996). If psychologists deliberately set out to design games that allow players to practice positive habits of thought, there may be great potential for beneficial effects.

Manuscript received 16 September 2008
Revised manuscript received 8 January 2009
Manuscript accepted 2 March 2009
First published online 22 July 2009

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