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Gender differences in explicit and implicit risk attitudes: A socially facilitated phenomenon

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The present study (a) examined the question of whether gender differences in hypothetical risk decisions might be socially facilitated by the presence of gender-homogenous groups and (b) investigated the conscious and non-conscious motivators of risk-taking through the application of both explicit and implicit measures of risk attitude. Using hypothetical choice dilemma items, no gender difference was found at an individual level; however, when placed in-groups, males expressed a stronger pro-risk position than females. While males self-reported a stronger pro-risk position than did females on two explicit measures of risk-attitude, no gender differences were found on two parallel implicit measures. However, a newly developed implicit measure of risk-attitude showed its utility in the form of convergent, predictive and incremental validity with respect to a behavioural outcome.

Simultaneously guarded against and courted with excitement, risk is a construct that is both praised and disparaged by societal judgement. Risk-takers themselves are seen as both heroes and fools, with the difference often determined by nothing but chance. How these mixed messages are internalized and formed into attitudes and behaviours is no doubt influenced by many factors not the least of which appears to be gender.

Males participate in higher risk sports, riskier driving, are involved in more road accidents, higher road fatalities and are over three-and-a-half times more likely to die from all accidental causes than are females (RTA, 2001). Being male places one in the highest risk demographic for early mortality in developed countries (Kruger, 2004). While experimental data support the notion that males are greater risk-takers than females, the differences are surprisingly small in comparison to real-life statistics (Byrnes, Miller, & Schafer, 1999). For instance, in a meta-analysis of studies that examined gender differences in risk-attitudes and behaviours, Byrnes *et al.* reported only modest effect sizes. Their meta-analysis divided studies into those that used self-reported behaviour, hypothetical choice scenarios and observed behaviour. They found small (i.e. < 2) average Cohen's effect sizes for each category. What is interesting is that,

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although small, a larger difference was found in gender comparisons of observed behaviour than in either of the other two self-report measures, possibly reflecting the influence of differential self-presentation concerns elicited by the divergent methodologies.

Regardless of the relatively modest differences observed in self-reported attitudes towards risk, the notion that males engage in more risk-taking behaviours than females is powerfully borne out by accident statistics. In the year 2000, the total number of males killed in Australian road accidents was 2.5 times greater than the number of females similarly killed (RTA, 2001). Similar differences have been found in the United States, Europe, Asia and Africa (WHO, 2002). Differences are even greater within the age range of 15–29 year olds, with the number of road fatalities for Australian males being 3.2 times greater than for Australian females (RTA, 2001). Interestingly, the type of accidents men and women are involved in has also been found to vary, with men being disproportionately involved in accidents resulting from risky driving, such as those involving overtaking or loss of control on bends (Waylen, 2002). These types of real-world statistics seem somewhat at odds with the relatively small effect sizes reported in experimental contexts.

Risk-taking as a social value

One possible explanation for this discrepancy is that the importance of social context might have been overlooked. That is, different values are attached to risk in different social contexts. For instance, because masculinity stereotypically shares a connection with risk-taking (Bem, 1981, 1993; Kelling, Zirkes, & Myerowitz, 1976), the company of other males might socially facilitate such behaviours. Demonstrations of in-group characteristics, such as risk-taking, may bolster self-esteem by winning admiration and praise from peers (Wilson & Daly, 1985), and may serve to embed the individual within this peer group (Jessor, 1987). Conversely, femininity is stereotypically associated with lower levels of risk-taking, particularly physical risk-taking. Extreme sports, fast cars and fist fights are not characteristically considered women's interests, and so endearment of oneself to such an in-group would not be facilitated by outward displays of such risky behaviours. While these differing in-group norms may exacerbate gender differences in risk attitudes and behaviours within real-world contexts, in experimental settings, where attitudes are generally measured via independent self-report questionnaires (Byrnes *et al.*, 1999), such group influences are absent. Notably, experiments using observed behaviours, where social influences are more likely to emerge, tend to produce the most robust gender differences (Byrnes *et al.*, 1999).

A look at passenger deaths and the influence of passengers on road accidents is also indicative of a social impetus (Williams, 2001) to risk-taking. Firstly, the number of male passenger deaths per 100,000 people is more than double that of comparable female deaths for the age range 17–25 (RTA, 2001). This might be explained by the probability that males are more likely to be travelling with other sensation-seeking males. However, the mere presence of a male passenger has been found to almost double the death rate per 1000 crashes for *both* male and female drivers, and two or more male passengers more than doubles it (Chen, Baker, Braver, & Li, 2000). This suggests that at least with respect to driving, risk-taking is being socially facilitated. That this enhancement of risk-taking occurs uniquely in the presence of males is supported by Chen *et al.*'s report that the presence of a female passenger served to reduce the likelihood of accident. In addition, a further report found that with a female in the car, males were observed to drive slower and to leave a greater distance between themselves and the car in front

(McKenna, Waylen, & Burkes, 1998). Combining Zuckerman's research into sensation seeking as a relatively stable trait (Zuckerman, 1994), with the observed passenger effects in accident data (Chen *et al.*, 2000; McKenna *et al.*, 1998; RTA, 2001; Williams, 2001), it seems probable that gender composites in-group dynamics may well be interacting with individual differences in risk-taking.

Definitions of the construct of risk

At a fundamental level, risk refers to 'exposure to the chance of injury or loss' (The Macquarie Encyclopedic Dictionary, 1995). Taken as such, it is difficult to see risk as anything but undesirable (Yates & Stone, 1994), yet the fact that people choose to actively engage with risk suggests that on some level risk is positively valued, rendering such an entirely pejorative definition somewhat inadequate. Given this limitation, a definition such as Leigh's (1999), who identifies risk-taking as those behaviours that involve some potential for danger while also providing an opportunity to obtain some form of reward, seems more appropriate. These two dimensions imply that an individual's evaluations of risk/risk-taking may not occur along a single bipolar dimension (e.g. gain or loss), but may rather be subject to multiple modes of evaluation (e.g. gain *and* loss).

Concurring with the dual attributes Leigh ascribes, and perhaps more succinctly stated, is the definition provided by Byrnes *et al.* (1999) who defined risk-taking as, 'the implementation of [goal directed] options that could lead to negative consequences'. For the purposes of the present study we accept Byrnes's definition. Firstly, it takes into account both the potential benefits that motivate risk-taking, and the potential negative consequences that serve as deterrents. And secondly, it is sufficiently broad to allow for the inclusion of a range of risk-taking behaviours, from the relatively innocuous risk represented by surfing, to the serious dangers associated with drink driving. While it has been argued that risk-taking is difficult to generalise across domains (e.g. Weber, Blais, & Betz, 2002), this paper takes the position that although variation may well be found across domains, attitudes towards the generalised construct of risk are super-ordinate to more domain-specific risk attitudes.

The present study

With the intention of examining whether same-sex social groups might differentially affect males' and females' risk-taking behaviours, the present study sought to apply a multi-method approach to the subject of gender differences in risk-taking. Firstly, it was thought that a multi-method approach might help elucidate the factors influencing inconsistencies in reported data; namely the relatively small gender differences observed in paper and pencil measures compared to the larger differences observed in real-world accident data. Working from the hypothesis that these inconsistencies might be at least partially due to social context effects, we wished to apply a range of measures to the examination of gender differences in risk taking, manipulating both social influences and degree of conscious control over responses. Secondly, we hoped that by exploring the contribution of social-context effects, in particular the presence of same-sex gender groups to gender-differences in risk-taking, we might provide a clearer picture of why males place themselves at such greater risk of accidental death than do females.

It was recognized that in order to explore methodological inconsistencies, we would need to incorporate a range of tools, theoretically permitting varying levels of conscious reflection and social-facilitation to impact on the measured variables. Thus, at one

extreme we wished to include a group task that would manipulate the salience of gender-role identity. In addition, we planned to incorporate conventional paper and pencil tests, as well as a behavioural measure that participants would be less likely to identify as self-reflective and might therefore complete in a less consciously controlled manner. Finally, we wished to include a measure of risk-attitude that would allow us to bypass subjects' capacity to consciously self-enhance (Kim, 2003b). To this end it was decided to develop a measurement tool that utilized the principles and structure of recently developed tests of implicit associations (Asendorpf, Banse, & Mucke, 2002; Greenwald, McGhee, & Schwartz, 1998; Kim, 2004a). By combining these various tools, it was hoped that a more complete picture of the social and person-based factors contributing to the reported gender differences in risk-taking attitudes and behaviours would emerge.

Implicit attitude measures

As stated earlier, there are two reasons that implicit attitude measures have attracted such interest in recent years. Firstly, they are said to allow for the assessment of attitudes that the respondent may not be consciously aware of due to the introspective limits of self-reports (Egloff & Schmukle, 2002; Greenwald & Banaji, 1995; Greenwald *et al.*, 2002). Secondly, they have been found to be less susceptible to social desirability effects and even voluntary distortion (Banse, Seise, & Zerbes, 2001; Kim, 2003b). Explicit measures of self-concept, for example, are based on information that is introspectively accessible to respondents at that point in time. As such they might include information about the person that stems from self-presentation concerns rather than from the construct under investigation. Implicit measures of self-concept, on the other hand, are based on information that is not intentionally given as self-informant. As a result, implicit measures do not always, and in fact rather infrequently correlate with explicit measures (e.g. Fazio, Jackson, Dunton, & Williams, 1995; Greenwald *et al.*, 1998; Rudman & Kilianski, 2000). Nonetheless they have been shown to demonstrate predictive validity, particularly with respect to non-conscious, behavioural responses (Asendorpf *et al.*, 2002), and have also been found to reliably predict people's membership in various groups including age (Hummert, Garstka, O'Brien, Greenwald, & Mellott, 2002), sex (Blair, Ma, & Lenton, 2001), ethnic attitudes (Greenwald *et al.*, 1998; Kim, Sarason, & Sarason, 2005), race/ethnicity (Greenwald *et al.*, 1998; Kim, 2003a; Ottaway, Hayden, & Oakes, 2001), smoking/non-smoking (Sherman, Rose, Koch, Presson, & Chassin, 2003; Swanson, Rudman, & Greenwald, 2001), vegetarianism (Swanson *et al.*, 2001) and even towards affect-based self-evaluations such as happiness (Kim, 2004b). In conjunction with the weak correlations generally reported, this predictive capacity suggests implicit attitudes may represent an *additional* construct that can be combined with existing knowledge about attitude formation and expression.

Admittedly, the IAT is a relatively new methodology and as such it remains somewhat controversial. For example, there has been some discussion over the extent to which the IAT provides a reflection of personal, as opposed to extrapersonal associations (Olson & Fazio, 2004). Olson *et al.* (2004) argue that implicit attitudes might be more representative of long-term societal exposure to collective attitudes, rather than to individually held evaluations of targets. Their argument seems supported by other studies that have examined respondents' attitudes towards stigmatized behaviours such as smoking (Sherman *et al.*, 2003; Swanson *et al.*, 2001). Swanson and colleagues found that smokers, despite explicitly stating a preference for smoking, implicitly revealed preferences for non-smoking. Contrasting this dissociation, members of non-stigmatized

groups such as vegetarians showed consistent patterns between explicit and implicit attitudes. Karpinski and Hilton (2001) have for some time argued in favour of an environmental association model of the IAT, in which scores reflect the associations a person has been exposed to in their environment, rather than the extent to which the individual consciously endorses those evaluative associations.

We believe that the development of an IAT variant that specifically targets risk will be useful in two respects. Firstly, the resistance of the IAT to social-desirability effects (Banse *et al.*, 2001) and the non-conscious nature of responding, will make the tool relatively invulnerable to social facilitation, thus providing a comparison for the self-report, behavioural and group-based measures also intended within the study. Secondly, encouraged by the fact that the potential gains and losses associated with risk-taking are well reflected by the comparative nature of the IAT task, we believe an implicit measure of risk-attitude may provide a valuable contribution to the prediction of risk-taking behaviours.

Rationale and research questions

We sought to answer the questions: Do gender differences in explicit/implicit risk-attitudes and behaviours exist within an experimental setting? Previous research (Byrnes *et al.*, 1999) suggests the existence of weak gender differences in risk-taking when measured in experimental settings, with females generally more conservative than males. Our first hypothesis was therefore that gender differences would be observed on self-report measures of risk-attitude.

Our second broad area of interest involved the question of whether an IAT targeting attitudes towards risk-taking might be useful in identifying an embedded propensity to engage in risk-behaviours and whether such a measure might be able to predict a unique portion of variance in such behaviours. Our third research question, therefore, concerned whether an implicit measure of risk attitude could predict risk-taking, and whether such predictive power would be above and beyond that offered by sensation seeking and a parallel explicit measure. As previous research has found weak to non-existent correlations between implicit measures and their explicit counterparts, particularly where social desirability concerns exist (Fazio & Olson, 2003), a similar dissociation is expected within this study. However, research also suggests that implicit measures are capable of predicting behaviours, especially where such behaviours are non-conscious or automatic (e.g. Asendorpf *et al.*, 2002). It was therefore expected that implicit attitudes towards risk would predict risk-taking behaviour and that this predictive capacity would be additional to any predictive power offered by a parallel self-report measure. We therefore hypothesized that the implicit measure of risk-attitude (IRT) would show weak correlations with corresponding explicit measures of risk-attitude and sensation seeking but that criterion/predictive validity would be found with respect to the more immersive and less controlled behavioural measure applied within this study, with this explained variance being over and above self-report measures (i.e. incremental validity).

As no data exist on implicit risk attitudes for either males or females, our own predictions were necessarily drawn from what is currently understood about implicit cognitions. The theory that implicit cognitions are the consequence of accumulative associations built up through experience and exposure to shared cultural values (Greenwald & Banaji, 1995; Karpinski & Hilton, 2001; Kim, 2005; Olson & Fazio, 2004) suggests that any prediction about risk-related implicit attitudes must first consider from where one would accrue such associations. Although gender-specific attitudes will

likely be partially formed in peer groups, and through differential gender-role values, both males and females are exposed to the same 'extrapersonal' (Olson & Fazio, 2004), mainstream messages about the dangers of risk-taking behaviours. Existing research suggests that this exposure should shape their implicit associations in a largely similar way. For instance, Olson *et al.* (2004) cite the finding that although about 80% of white participants reveal some degree of negativity towards Blacks on the IAT, Black respondents do not tend to show such an in-group preference. The authors reasoned that having been exposed to the same negative racial stereotypes in the media, even Blacks, for whom a host of positive associations with Blacks would be consciously accessible, cannot help but reflect the accumulation of these negative stereotypes in their IAT responses. Similarly women respondents have been found to more easily associate with traditional female stereotypes on the IAT than on explicit measures (Greenwald & Farnham, 2000), again possibly reflecting their exposure to these stereotypes in mainstream media. We hypothesized that, despite distinct peer group experiences, shared exposure to negative media messages about risk-taking would result in an absence of gender differences on the IAT developed for this study.

With respect to risk-behaviours, the finding that observational data and real-life accident statistics produce greater gender differences than self-report measures, led us to hypothesize that the behavioural measure employed would yield a larger gender difference than the self-report measures, with males exhibiting greater risk-behaviours.

Finally, our third theme involved exploring of the possibility that risk-taking may be differentially facilitated within gender-homogenous groups, with groups of males exhibiting more extreme risk-behaviours than both groups of females, and solitary males. Working from the social identity explanation of the group-polarization phenomenon, the perception that risk-taking is more strongly associated with masculinity than it is with femininity suggests group discussion with same-sex others should lead to an exaggeration of gender differences in risk-attitude. To test this assumption we sought to answer the question of whether gender differences in risk attitudes are socially facilitated within same-sex group discussions. If gender-role norms prescribe different values to risk-taking for males, as opposed to females (Bem, 1993; Kelling *et al.*, 1976; WHO, 2002; Wilson & Daly, 1985), then a desire to subscribe to these norms should be most pronounced when in the presence of one's own gender group (Tajfel, 1982; Wilson & Daly, 1985). This led us to hypothesize that groups of males would make riskier decisions than both groups of females and solitary males.

Method

Participants

Participants were 126[1] students from introductory psychology courses at Macquarie University (25 male control, 25 female control, 41 male experimental, 35 female experimental; age of $M = 22.7$ years, $SD = 5.7$), of which 30 students participated in exchange for course credit, with the remaining 96 students being paid for participation. Subjects were randomly assigned to experimental and control groups.

Overview of procedure

All participants completed four tasks. Firstly, they completed demographic and personality questionnaires including impression management and optimism scales.

[1] *Throughout this paper df varies due to missing values on some scales.*

Secondly, there were several pre-test tasks, including explicit, implicit[2] and behavioural measures of risk. Thirdly, those who attended the experimental session participated in a group (sizes ranging from 3 to 5) discussion of six vignettes of hypothetical risk scenarios. The manipulation was intended to facilitate a gender-specific social influence, with regard to a consideration of risk-taking. The vignettes involved an hypothetical individual who was faced with a decision between a riskier, though more attractive option, vs. a safer and less desirable options. For participants in the control condition, this stage of the procedure varied only insofar as they did not participate in the group discussion. Instead, they read through the vignettes individually in their curtained booths. Fourthly, the main dependent variable was generated by asking respondents to indicate the level of risk they would consider acceptable before advising the hypothetical individual to pursue the riskier course of action. While this decision was a collective decision for the experimental groups, for those in the control condition the decision was made independently. All participants completed the questionnaires and behavioural tasks in curtained booths within a laboratory. The group discussion was conducted in a common area of the same laboratory.

Personality measures

Impression management

Paulhus's (1988) Balanced Inventory of Desirable Responding (BIDR) (Cronbach's $\alpha = .78$, this study) was also included, with the intention of exploring correlations between the various risk-attitude measures and the impression management component of the BIDR.

Optimism

The Life Orientation Test-Revised (Scheier, Carver, & Bridges, 1994) (Cronbach's $\alpha s = .49$, this study) was included to explore the relationship between optimistic bias, theoretically linked to risk-taking through its influence on risk-perception (Chapin, 2001; DeJoy, 1992; Felton, Gibson, & Sanbonmatsu, 2003; Gibson & Sanbonmatsu, 2004) and risk-taking.

Risk measures

Sensation seeking

A measure of sensation seeking was taken using Zuckerman's (1994) Sensation Seeking Form V (Cronbach's $\alpha = .80$, this study). Sensation seeking is presented by Zuckerman as a stable, personality trait that is associated with a range of risk-taking behaviours.

Semantic differential scales

In addition to sensation seeking we wanted to employ an explicit attitudinal measure that would act as a counterpart to the implicit measures explained below. It was recognized that there is a potential problem with asking people about 'risk' as an abstraction, as even high risk takers may state they do not positively value 'risk'. At the

[2] *Following the procedure traditionally employed in IAT research (Banse* et al.*, 2001; Greenwald* et al.*, 2003; Kim, 2003a; Swanson* et al.*, 2001), we decided not to counterbalance the order of the implicit and explicit measures but rather to have all participants complete the explicit measures first. Both meta-analyses (Hoffman, Gawronski, Gschwendner, Le, & Schmitt, 2004) and recently collected experimental data (Nosek, Greenwald, & Banaji, 2005) suggest that measurement order does not produce a consistent or reliable effect.*

same time, due to such things as a higher perceived skill level, optimistic bias, or a normalization of risky behaviours within social groupings, individuals may fail to recognize their own risk-taking behaviours as truly risky (Jacobs, 2002). They may therefore continue to engage in risk-related activities, even when they explicitly devalue the abstract construct of risk. To try and address these potentially different levels of risk (i.e. general vs. specific), participants were requested to identify 10 risk activities they felt to be most relevant to their lives, from a list of 35 risk-behaviours from a number of domains ranging from surfing, to heroin use, and then to reduce this list to 6. Their 6-item selections were then used in the form of an explicit semantic differential task, where participants evaluated the stimuli on seven, seven-point Likert-type scales. The scales used the bipolar representations of loss/gain, failure/win, mistake/success, penalty/benefit, waste/achieve, lose/reward and cost/profit; these evaluative categories being the same as the attribute stimuli used in the implicit measures (IRTs), which will be explained in detail later. Following this, subjects repeated the procedure for the global concept of 'RISK' alone. These two semantic differential scales served as explicit parallels to the implicit risk tasks explained below. Cronbach's αs for the IRT-Global and IRT-Unique were .85 and .95, respectively.

Choice dilemma items

An adaptation of Kogan & Wallach's (1964) Choice Dilemma Questionnaire (Cronbach's $\alpha = .50$) was also completed by subjects, first individually and then within the experimental manipulation. The Choice Dilemma Questionnaire is a decision making task that asks subjects to choose between a risky course of action, with a more desirable outcome, and a safe course of action with a less desirable outcome. To make the original questionnaire more relevant to a contemporary Australian, mixed gender subject-pool, and in keeping with the APA guideline of avoiding the use of gender specific terms (APA, 2002, p. 66), the wording of the questionnaire and certain items were modified. For instance, all gender specific references (i.e. Mr A) were presented in gender-neutral terms (i.e. person A), references to annual incomes (i.e. $6,000) were modified to account for inflation (i.e. $50,000) and an item involving a 'College X's football team' was changed to 'University X's tennis team'. In addition, the total number of items was reduced from 12 to 6. As previous studies have used similarly reduced questionnaires (DiBerardinis, Ramage, & Levitt, 1984; Hogg, Turner, & Davidson, 1990; Myers, 1974) with no reported ill-effects, it was decided that such a strategy would not compromise the validity or reliability of the measure.

The implicit risk task—global

The IRT-Global (Cronbach's $\alpha = .73$) was developed based on the same rationale and paradigm as was used for other implicit measures (Asendorpf *et al.*, 2002; Banse *et al.*, 2001; Egloff & Schmukle, 2002; Greenwald *et al.*, 1998; Kim, 2004a). The IRT-Global provides an indirect measure of respondents' non-conscious 'global' evaluations of risk by assessing the strength of implicit/automatic associations of the attributes, 'GAIN' and 'LOSS', with the theoretical category of 'RISK'. The theoretical logic of the task states that when the two concepts that share a response are strongly associated and spontaneous to an individual, the sorting task is easier than when the two response sharing concepts are weakly associated, or not relatively spontaneous to the individual. In the case of the IRT, if an individual more powerfully associates risk with gain, they will find the RISK + GAIN classification task easier than when RISK is paired with LOSS attributes (RISK + LOSS). Individual variations in participants' unconscious attitudes

towards risk are therefore calculated via the relative response latencies under these two conditions.

The IRT-Global task asked participants to classify the stimulus 'RISK' versus the stimulus '[ ]' (i.e. open brackets appeared in place of a word), while simultaneously discriminating attribute stimuli (i.e. GAIN vs. LOSS word meanings) as fast as they could and avoiding errors. Only one stimulus, 'RISK' was used for the RISK category, with '[ ]' alone appearing for the alternative category, therefore defining the measure as a global evaluation of risk alone, and not as a comparative or relative measure of risk as opposed to security, or some other such antithetical representation. A similar uni-dimensional modification of the conventional IAT format has been used successfully by Kim (2004a) to measure implicit life satisfaction (ILS). Such a format was deemed preferable due to the existence of some debate in the literature over whether risk propensity and risk aversion can be conceptualized as two poles of a one-dimensional attitude, or rather as two distinct concepts (e.g. Rohrmann, 2002). In addition Karpinski (2004) has demonstrated that in the case of self-esteem-IATs, the 'other' against which the self is judged can alter the mental representation of the self, as measured by the IAT. Preferably, he suggested the use of neutral stimuli might act as a remedy to the limitation.

Possible attribute stimuli were collected from a search of gain and loss synonyms that provided an initial list of 62 words. Ten undergraduate psychology students then assessed this list after being asked to select the 10 gain and loss words they felt most salient to risk-taking situations. The list was then reduced and redistributed, leading to a consensus being reached on seven gain (gain, win, success, benefit, achieve, reward, profit) and seven loss words (loss, failure, mistake, penalty, waste, lose, cost). These fourteen words were then used as attribute stimuli for both implicit measures as well as corresponding self-report measures.

Participants were told they would be making a series of category judgements and were initially instructed to classify stimulus words into two categories (RISK and [ ], GAIN and LOSS) for a 30-trial practice block (Block 1, 2 and 4). In addition to these single blocks, data collection blocks of 40-trials (Block 3 and 5) asked participants to sort stimuli representing *four* concepts into just *two* categories – each including two of the four concepts. This resulted in subjects completing two conditions; (1) RISK combined with GAIN, and [ ] with LOSS; and (2) RISK combined with LOSS, and [ ] with GAIN. During the combined tasks, stimuli alternately came either from one category pair (e.g. GAIN vs. LOSS) or the other (e.g. RISK vs. [ ]). On each trial, they viewed a stimulus word displayed in the centre of the monitor and gave responses with either their left forefinger (using the 'A' key) or right forefinger (using the '5' key on the right-side numeric keypad). An inter-trial interval of 150 ms was used. The computer recorded the elapsed time between the start of each stimulus presentation and the correct response. If the participant made an incorrect categorization, the stimulus was replaced by the word 'Error' until the correct response was made.

The implicit risk task – unique

Following the same paradigm and method used by Kim (2004a) on the 'implicit life satisfaction — unique', the unique variant of the IRT (Cronbach's $\alpha = .95$) replaces the global construct of risk with self-selected risk behaviours unique to each subject. Thus instead of providing an evaluation of risk as an abstract construct, the IRT-Unique provides an indirect measure of participants' evaluations of personally relevant risk-activities. The first screen of the IRT-Unique test asked participants to type in the six risk

activities they had selected as being personally relevant risk domains during the earlier self-report responses. For instance, a participant might have identified drink driving, unsafe sex, speeding, marijuana use, surfing, fist fighting and bungee jumping during the earlier stage of the experiment. The participant would then enter these words via the keypad and the computer program would automatically use these six items in lieu of the stimulus word 'RISK' during all blocks. As with the IRT-Global, the opposing category and stimuli was simply '[ ]' and the attribute words for the categories 'gain' and 'loss' remained the same. Thus, with the exception of replacing the word 'RISK' with these self-selected activities, the format and procedure were the same as those for the standard IRT-Global.

The order of the implicit measures (IRT-Global and IRT-Unique) was fully counterbalanced between subjects, as was the within-subject conditions in each session (RISK + GAIN and RISK + LOSS).

Behavioural measure of risk

Lejuez *et al.*'s (2002) Balloon Analogue Risk Task (BART) (Cronbach's $\alpha = .87$, this study) presented participants with an on-screen balloon accompanied by a balloon pump. With each pump, participants accrued one cent in a temporary bank, however, when pumped past a certain point, the balloon exploded, causing all money in the temporary bank to be lost. Participants could, however, choose to transfer their winnings to a permanent bank at any time, causing them to move on to the next balloon. Each of the 30 balloons presented, lasted either until the participant collected the money or the balloon exploded. Although indistinguishable to participants, three types of balloons were included, with average breaking points of 64, 16, and 4. The explosion point of the individual balloons was randomly determined within fixed odds ratios 1/128, 1/32, and 1/8. The dependent variable was taken as the average number of pumps on all unexploded balloons (Lejuez *et al.*, 2002). Other variables, such as the number of exploded balloons, or the amount of money earned, provide less between-subject variance than the adjusted average that has been used in validation studies (Aklin, Lejuez, Zvolensky, Kahler, & Gwadz, 2005; Lejuez *et al.*, 2003, 2002).

The BART is said to identify an overall propensity for risk, rather than trying to uniquely predict specific risk-taking behaviours, and is designed to simulate the fundamental contingencies of real-life risk activities. As the balloon size increases, and money accumulates in the participant's temporary bank, each additional pump represents a greater risk than the last, with both proportional earnings diminishing, and the chances of explosion increasing. The extent to which participants' are prepared to tolerate this incremental risk on each additional pump, seeing the potential for gain as more motivating than the potential for loss, is taken as a reflection of their risk generalized risk-taking propensity.

This key feature of the BART, requiring subjects to continually balance the potential gain of increasing their winnings against the potential risk of losing all money acquired for that balloon, creates a situation in which rational decision making becomes increasingly difficult and allows for the tapping of less controlled responses. In addition, the immersive nature of the task, the sounds associated with financial gains, the explosions associated with losses as the balloons explode and the rapid responses that the task structure engenders, together serve to elicit from participants less considered and controlled responses than self-report measures of risk-taking propensity.

The BART has demonstrated convergent validity with the Barratt Impulsiveness Scale ($r = .28$), and Zuckerman's Sensation Seeking Scale ($r = .35$) as well as self-reported

occurrences of risk-taking behaviours including smoking ($r = .36$), alcohol ($r = .28$), other drug use ($r = .28$), gambling ($r = .44$) and theft ($r = .25$) (Lejuez *et al.*, 2002).

Experimental manipulation

To evaluate the hypothesis that gender differences in risk-attitude are socially facilitated by same-sex groupings, a group discussion task was included that adapted the task and instructions of the risky-shift experimental design (Hogg *et al.*, 1990; Stoner, 1961; Wallach, Kogan, & Bem, 1962). Subjects were invited to come out of their booths and participate in a discussion of modified items from the Choice Dilemma Questionnaire they had previously individually encountered in the questionnaire packets. Discussion times ranged from 5 to 10 minutes, during which time the experimenter was absent from the room. A typical session involved one person reading the hypothetical scenarios, followed by some members advocating the benefits of the riskier option and others articulating the relative merits of the more cautious option.

Dependent variable

Participants in the experimental condition were instructed to discuss each item, reconsider their initial responses and arrive at a group decision that each member felt was a satisfactory representation of their own opinion. Eventually, in the light of the group context and discussion, evaluation would take place and a unanimous group decision would be reached. Despite this being a group decision, emphasis was placed on the need for the group consensus to be a satisfactory representation of each individual's involvement and opinion in an attempt to avoid premature acquiescence.

In lieu of this group decision, control subjects remained in their individual, curtained booths and were presented with a fresh copy of the Choice Dilemma Questionnaire. They were asked to take their time in reading the items again, rethinking their initial choices, and then to indicate the preferences they felt were a satisfactory representation of their opinions at that moment.

Results

Initial analyses of implicit data

An improved scoring algorithm recently introduced by Greenwald, Banaji, and Nosek (2003) was used for the IRT, as the new scoring has been shown to possess superior psychometric properties, including higher correlations with explicit measures and larger effect size. In this study, all statistical analyses were conducted using this new scoring method (D score).

The IRT effect was calculated by subtracting the mean response time on the RISK + GAIN pairing from the mean response time on the RISK + LOSS pairing. A positive IRT effect therefore indicated stronger associations of risk with gain.

Unless otherwise stated the significance level for subsequent statistical analyses was 0.05.

Gender differences in attitudes towards risk

Explicit measures

We hypothesized that compared to females, males would show more positive attitudes towards risk on explicit measures of risk-attitude, as well as displaying greater risk-taking behaviour. On the global-risk semantic differential scale male participants' evaluations of

risk ($M = 4.87$, $SD = 1$) were more positive than females' evaluations ($M = 4.39$, $SD = 1.19$), $F(1, 114) = 5.63$, $p = .019$, Cohen's $d = .44$. Similarly, on the unique-risk semantic differential scale males ($M = 3.72$, $SD = 1.05$) were more positive about their self-selected risk-behaviours than were females ($M = 3.27$, $SD = 1.07$), $F(1, 119) = 5.30$, $p = .023$, Cohen's $d = .42$. On the Sensation Seeking Scale males, ($M = 21.31$, $SD = 5.60$) were slightly higher than females ($M = 19.21$, $SD = 6.94$), showing the difference to be marginally significant, $F(1, 119) = 3.37$, $p = .07$, Cohen's $d = .33$.

Behavioural measure

To address whether males took greater risks on the behavioural measure than females, performance scores on the BART were compared using an independent samples t test. In keeping with the logic and methodology employed in the latest application of the BART (Aklin *et al.*, 2005), the dependent variable was taken as the average number of pumps on all unexploded balloons. This 'adjusted' average was deemed preferable, as the number of pumps on exploded balloons is necessarily restricted, thereby reducing the variability between participants. The direction of the effect was consistent with the differences observed on the attitudinal measures, with males averaging $M = 40.71$ pumps ($SD = 13.25$), and females $M = 38.17$ ($SD = 13.37$), Cohen's $d = .19$. However, the t test produced a non-significant result $t(118) = 1.05$, $p = .30$.

Implicit measures

To evaluate the sensitivity of the IRT to detect between subject variation a one sample t test was conducted for both the IRT-Global, $t(106) = -3.90$, $p < .005$, and the IRT-Unique, $t(106) = -3.25$, $p = .002$. To compute internal consistency for the ILS, the same procedure was adopted as was used for the other IAT type measures in previous studies (Banse *et al.*, 2001; Egloff & Schmukle, 2002; Kim, 2004a). As stated, Cronbach's alphas of IRT-Global, IRT-Unique were .73 and .95, respectively.

Hypothesis two stated that gender differences on implicit measures would be non-significant. As expected, males and females were not found to differ on the IRT-Global, where the average IRT effect for males was $M = -.12$, $SD = .33$ and for females $M = -.16$, $SD = .39$, Cohen's $d = .11$, $t(105) = .58$, $p = .56$. Nor was there a difference on the IRT-Unique where the mean IRT-effect for males was $M = -.08$, $SD = .43$, and for females was $M = -.19$, $SD = .40$, Cohen's $d = .26$, $t(105) = 1.35$, $p = .18$. It is worth noting that all IRT-effects were in a negative direction, indicating faster reaction times when risk was paired with loss, than when risk was paired with gain.

Impression management and risk-attitudes

To explore the association between self-presentation concerns and risk-attitudes we conducted a number of bivariate correlations and found both sensation seeking and the Global Risk Semantic Differential Scale to be significantly related to impression management, $r = .29$, $p = .001$, and $r = .19$, $p = .04$, respectively. These correlations were then explored by gender. Male scores on impression management significantly correlated with sensation seeking $r = .34$, $p = .005$, though not the Global Risk Semantic Differential Scale $r = .09$, $p = .48$. Female scores on the impression management scale did not correlate with either sensation seeking, $r = .19$, $p = .17$, or the explicit risk measure, $r = .21$, $p = .13$. No significant relationship was found to exist between impression management and the IRT-Global, $r = .004$, $p = .96$, nor the IRT-Unique, $r = .04$, $p = .70$. Similarly, the behavioural task (BART) was not associated with impression management, $r = .01$, $p = .90$.

The social facilitation of gender differences in risk

This section of the experiment involved a mixed-model design: 2 within participant factors (pre-and post-test) × 2 (male and female) × 2 (experimental and control). In completing the CDQ, participants were asked to indicate the lowest probability of success they would consider acceptable for pursuit of the riskier option. Thus, lower scores on the CDQ indicate a greater tolerance of risk.

To address the third hypothesis that gender differences would be larger when measured in the group context than when measured individually, we first compared the difference score of the pre and post-test CDQ for the male experimental group against the average of the other three groups (i.e. contrast test)[3]. In order to control for an increase in the likelihood of a type one error, an analysis of covariance (ANCOVA) was used, controlling for variations between the two groups in pre-test scores. As expected, males who had been exposed to the group discussion did express a significantly riskier position in post-test than in pre-test CDQ scores, $F(1, 119) = 20.31, p < .005$ (Cohen's $d = .94$). We also conducted subsequent analyses on the difference score comparing the experimental group with the control group; for males, $F(1, 119) = 16.93, p < .005$ (Cohen's $d = .58$) and females, $F(1, 119) = .14, p = .71$ (Cohen's $d = .11$). Importantly when we compared the gender difference in the control condition, no difference was found, $F(1, 119) = .56, p = .46$ (Cohen's $d = .45$), whereas in the experimental condition, a significant difference was present, $F(1, 119) = 10.10, p < .005$ (Cohen's $d = .30$) (Fig. 1).

As CDQ scores within the experimental condition were a product of group discussion, we thought it prudent to conduct additional analyses using group scores as the dependent variable. Again an ANCOVA was conducted (controlling for pre-test variation) analysing the difference in CDQ scores[4]. As above, we first compared the difference score for males who had received the experimental manipulation against the average of the other three groups, $F(1, 28) = 7.36, p = .01$ (Cohen's $d = .93$). No difference was found for males and females in the control condition, $F(1, 28) = .27$, $p = .61$ (Cohen's $d = .15$). In addition, with the dramatic reduction in power, the significant gender difference previously found in the experimental condition was reduced to a non-significant level, $F(1, 28) = 2.07, p = .161$ (Cohen's $d = .39$). We reason that with more power, the same pattern of gender differences within the experimental condition, observed when individuals were used as the unit of analysis, would emerge. Importantly however, while no difference was found between females in the experimental and control conditions, $F(1, 28) = 1.17, p = .29$, (Cohen's $d = .63$) a significant difference was still apparent between males who received the manipulation and those who did not, $F(1, 28) = 9.46, p = .005$ (Cohen's $d = 1.16$).

Validation of the IRT

Convergent validity

As expected, Table 1 shows both the IRT-Global and the IRT-Unique shared little convergence with sensation seeking. The IRT-Global weakly correlated with its explicit parallel task — the Risk-Global Semantic Differential Scale, $r = .11$, $p = .27$, and significantly correlated with the Choice Dilemma Questionnaire, $r = .29$, $p = .002$.

[3] *Analysing via means of a repeated measures ANOVA provided the following results for the three-way interaction; CDQ-Shift by Group by Gender, F(1, 120) = 1.28, p = .26.*

[4] *Analysing via means of a repeated measures ANOVA provided the following results for the three-way interaction; CDQ-Shift by Group by Gender, F(1, 29) = .65, p = .43.*

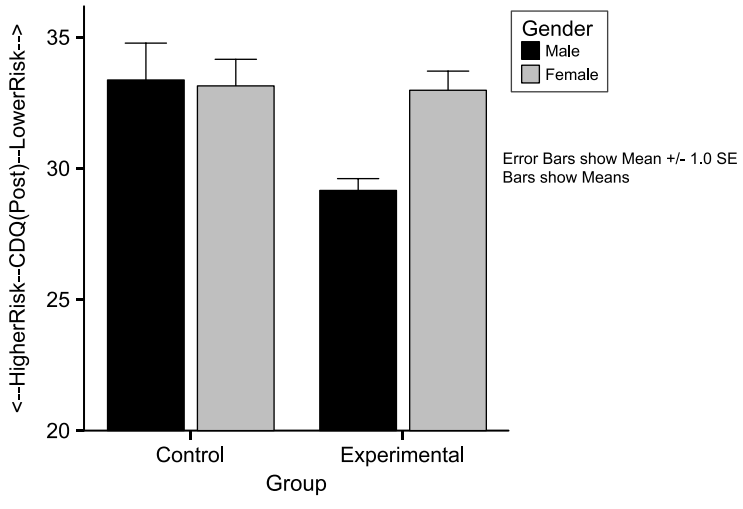

Figure 1. Post-test scores on CDQ measure by gender and condition.

The IRT-Unique positively correlated with its parallel, explicit risk measure, i.e. the Risk-Unique Semantic Differential Scale, $r = .28$, $p = .003$.

Table 1. Intercorrelations of the risk measures and related constructs

Variable	1	2	3	4	5	6	7	8
1. SSS-V								
2. RG-SDS	.23*							
3. RU-SDS	−.02	.37						
4. CDQ	−.20*	−.14	−.09					
5. BART	.10	.17	.10	−.02				
6. IRT-Global	.07	.11	−12	−.29**	.25**			
7. IRT-Unique	−.05	.11	.28**	−.13	.14	.41**		
8. LOT-R	−.06	.20*	.17	.10	.16	.22*	.10	
9. Impression management	.29**	.19*	.05	.07	.01	.004	.04	.14

Note. (1) Sensation seeking scale V; (2) Risk-global semantic differential scale; (3) Risk-unique semantic differential scale; (4) Choice dilemma questionnaire – note that lower scores indicate riskier decisions; (5) Balloon analogue risk task (BART); (6) IRT-global; (7) IRT-unique; (8) Life orientation test – optimism; (9) Balanced inventory of desirable responding – impression management.
*$p < 0.05$, **$p < 0.01$.

To further explore the convergence and divergence of the different methodologies, r to z conversion was used (Campbell & Fiske, 1959). The average correlations among explicit measures (global and unique risk semantic differential scales) and among implicit measures (method effects) were .42 and .35, respectively, while the average correlation between the independent measures of the same traits (trait effects) was .23, overall indicating the divergence of explicit and implicit measures of risk-taking.

In addition, the IRT-Global was found to positively correlate with optimism, $r = .22$, $p = .03$, suggesting the implicit measure is sensitive to variations in this personality construct that has been reported to impact on risk-perception, and subsequently

risk-behaviour (Chapin, 2001; DeJoy, 1992; Felton *et al.*, 2003). While the IRT-Global's explicit counterpart also correlated with optimism, $r = .27, p = .006$, using hierarchical regression analyses we found that this was not due to variance shared by the implicit task, with the IRT-Global causing an R^2 change of .06, $F = 6.18$, $p = .015$.

Predictive and incremental validity

Importantly, a significant positive correlation was observed between the IRT-Global and the BART, the behavioural measure applied within this study. No such correlation was found to exist for the parallel explicit measure (RG-SDS), or other explicit measures, with the exception of the Risk Attitude Scale. To examine the implicit measure's predictive power over and above that provided by its parallel explicit measure (RG-SDS), and the Sensation Seeking Scale, which has been reported to be an important predictor in risk research, a hierarchical regression analysis was performed with the BART measure as the dependent variable. Step one included both Sensation Seeking and the RG-SDS which together accounted for 5.6% of variance in the BART $F(2, 98) = 2.83$, $p = .064$. Inclusion of the implicit measure resulted in an R^2 change of .055, $F(1, 98) = 5.83$, $p = .02$, indicating the validity of the IRT-Global is incremental to that explained by self-reports.

Discussion

A summary of findings

The primary goal of this study was to investigate gender differences in risk-attitudes and behaviours, and in particular to see how gender-homogenous social groups might affect such differences. As expected, when measured via self-report, males were found to have more positive evaluations of risk, both as an abstract construct, and in response to individually selected risk activities. Contrasting this, implicit evaluations of the same stimuli revealed no differences between males and females. In addition, while males and females were not found to differ in their individual attitudes towards hypothetical risk decisions, when measured within group contexts, males advocated a greater tolerance for risk than females; supporting the notion that risk may have a stronger social value for males than females. Importantly, encouraging results were present for the utility of an implicit measure of risk-attitude, the IRT-Global. The IRT-Global was the strongest predictor of risk-taking behaviour (BART), and demonstrated predictive strength over and above the combined predictive power of a parallel explicit measure and Zuckerman's Sensation Seeking Scale (1994).

Gender differences in risk-attitudes and behaviours

We found that males and females differ in terms of their self-reported attitudes towards risk, though not on their non-conscious evaluative responses. Coupled with the fact that the implicit, though not the explicit measure was able to predict risk-behaviour, this lends support to the view that implicit and explicit attitudes are distinct constructs, formed in distinct ways (Karpinski & Hilton, 2001).

It has been suggested that implicit attitudes are formed over long periods (Kim *et al.*, 2005), during which time the dominant cultural values of one's environment operate as a kind of psychological wallpaper accumulating at an non-conscious level (Baccus, Baldwin, & Dominic, 2004; Karpinski & Hilton, 2001; Kim *et al.*, 2005). While Australian culture contains many sub-groups who value risk-taking, for the most part the messages received from parents, from schools and from the media, is that the potential gains risk

offers, are far outweighed by the harm it threatens. Such a cultural value appears to be reflected in our finding that participants had stronger negative than positive associations with risk. If these messages are processed non-consciously, as has been suggested may be the fundamental distinction between explicit and implicit attitudes, then such associations might be relatively immune to consciously motivated desires. Such a position is supported by the non-significant correlations between both IRT measures and impression management. On the other hand, if indeed risk-taking is part of the perceived in-group norm for males, then according to the principles of social-identity theory (Ellemers, Spears, & Doosje, 2002; Tajfel, 1982), males should be consciously motivated to represent themselves as risk-takers, in a way that females are not. It is reasonable to suspect that such motivations may well be captured when subjects are asked to consciously report on their own attitudes, a suspicion that is supported by the explicit risk measures significant correlations with impression management. Thus, the gender difference that emerged within self-reported attitudes towards risk might reflect a difference in how the two genders choose to consciously align themselves with the construct of risk due to differentiated gender-group norms.

Social facilitation of gender differences in risk

The finding that gender differences in attitudes towards hypothetical risk choices emerged only within gender-homogenous groups is of great interest. Firstly, this sheds some light on why such large inconsistencies are generally found between experimental data (Byrnes *et al.*, 1999) and real life data (Elliot, 1987; Evans & Wasielewski, 1983; Harre, Field, & Kirkwood, 1996; Kruger, 2004; Private, 2003; RTA, 2001; WHO, 2002).

Western societies, where the majority of research and theory development is conducted, place a strong emphasis on personal identities (Triandis, 1989), and as a result the majority of research is on the analysis of individual processes and interpersonal processes (Ellemers *et al.*, 2002). In the case of an examination of gender differences in risk-attitudes, this means that there is little opportunity for socially facilitated gender differences to emerge. In real-world settings on the other hand, males and females generally spend more time in same-sex social groups (Martin & Fabes, 2001) and it is in these contexts that the larger gender differences in risk-taking are implied by accident data. Certainly in the case of motor vehicles, where it is easy to determine the immediate social context, the chance of risk-taking has been found for males to incrementally increase with the addition of additional same-sex passengers (Chen *et al.*, 2000; Ulleberg, 2004; Williams, 2001). Within this study, the significantly riskier decisions made by males when in same-sex group contexts suggests that higher levels of male risk-taking may well be a function of social context.

A consideration of why group settings increase gender differences in this way requires a consideration of what it is that group contexts elicit. Social identity theory (Tajfel, 1982) holds that people not only categorise the social world into in-groups and out-groups, but also that they derive a sense of self-esteem from their membership to in-groups. Placed in gender-homogenous experimental groups, or in a car full of same-sex passengers, the salient in-group is that of one's gender. In such a setting, social identity theory predicts both the endorsement of in-group norms and conformation to the prototypical in-group position (Ellemers *et al.*, 2002). While gender itself may not always predict differences in risk-attitudes and behaviours, there exists a culturally embedded belief that a sense of adventure, daring and bravery is more prototypical of males than it is of females (Wilson & Daly, 1985). The pull towards a riskier position is

therefore stronger for males than for females due to the differing gender-role stereotypes of masculinity and femininity.

Implicit risk attitudes

The finding that the IRT-Global is able to predict risk-taking behaviour where comparable self-report attitude and personality measures fail, suggests the IRT may represent a valuable contribution to the field of risk research. Although recent efforts have been made to develop new instruments (e.g. Lejuez *et al.*, 2002), investigation into individual differences in risk-taking behaviours and attitudes has for some time been methodologically limited by a reliance on self-report measures. The functional utility of a risk-attitude measure that reduces the potential for response bias, supported by the present finding of a non-significant relationship between these implicit measures and impression management, lies in the possibility of reducing certain dangerous and costly risk-taking activities through the identification of at-risk individuals and groups. A measure that is able to explain a portion of variance in risk-taking behaviour that is unexplained by self-report measures is therefore of great theoretical and practical value.

It is also interesting that the IRT-Global demonstrated a significant positive correlation with the trait of optimism, as it has been claimed that optimistic bias is an important element in the consideration of risk-taking propensity (Chapin, 2001; DeJoy, 1992; Felton *et al.*, 2003; Gibson & Sanbonmatsu, 2004). Risk perception is a crucial element in choosing to engage in various forms of risk-taking, including safe-sex practices (Chapin, 2001), disease immunization (Brewer, Weinstein, & Cuite, 2004) risky driving (DeJoy, 1992) and risky sports (Jacobs, 2002). Conversely, it has also been found that situations of adversity and threat may increase individuals' levels of positive illusions as a coping mechanism (Taylor & Armor, 1996). Thus to a point, such positive illusions are adaptive, allowing one to function in the face of overwhelming odds.

However, the association between positive illusions (Taylor, 1994) and increased feelings of invulnerability are by implication theoretically linked to a higher tolerance for risk. While bolstering psychological well-being (Taylor, 1994), unrealistic illusions of control may suppress the feelings of anxiety that might otherwise serve to warn of danger (Dahlback, 1990). Those individuals who, by virtue of their optimism, experience relatively low levels of anxiety when confronted by risk, are likely to focus more on the potential gains that risk-taking offers than the potential losses. In addition, when assessing risky decisions a higher level of optimism may diminish the salience of any negative consequences that previous risk-taking incurred. It is therefore possible that those who are more optimistic and positive in their general life-outlook, may be overly tolerant of risk, viewing it more favourably and engaging in it more readily. The observed association between the IRT-Global and optimism might then be taken as an indirect form of convergent validity; the IRT-Global is associated with a personality construct that underlies a tendency towards risk-tolerance and risk-taking (DeJoy, 1992; Desrichard, Verlhiac, & Milhabet, 2001).

While the explicit version of the global-risk task also correlated with optimism, the explanatory power of the implicit measure was found to be distinct. We suggest that this distinction may be due to the implicit measure's unique differentiation from impression management. It is possible that participants' positive, non-conscious evaluations of risk might in part be due to an embedded and non-conscious optimistic bias. Contrasting this, the shared relationship between their positive, explicit evaluations of risk and optimism might stem more from conscious considerations of both risk and optimism as

desirable qualities. Thus, although at a superficial level, explicit and implicit attitudes appear to be telling the same story, the themes that underlie the two are discrete.

The finding that the IRT-Global is able to identify a generalized risk-taking propensity provides a good argument for the development of more focused IRT measures that could be designed to target specific behaviours. It is after all the more undesirable risk-behaviours that are most subject to the confounding influence of self-presentation. An IRT that could identify those individuals who implicitly associate speeding for instance, with gains rather than losses, might be used to create more focused interventions, and might also serve to alert individuals to the presence of this tendency within themselves. The theoretical nature of implicit attitudes suggests that such individuals may not be aware of possessing such associative structures (Asendorpf *et al.*, 2002; Greenwald & Banaji, 1995; Greenwald *et al.*, 1998). The self-relevant information that an IRT might provide may therefore assist people in the mutually advantageous self-monitoring of their behaviours.

Whereas a domain-specific measure might be useful in measuring attitudes towards specified risk-activities, and the IRT-Global seems to be useful in predicting general risk-taking, the IRT-Unique's utility might lie in what it reveals about a person's attitude towards those risky activities they have encountered in their own lives. The fact that this unique measure correlated not only with its explicit parallel (UR-SDS) but also with the Global Semantic Differential Scale (GR-SDS) suggests that explicit attitudes towards the global construct of risk are not entirely distinct from implicit evaluations of self-relevant risk-activities. Allowing subjects to select self-relevant activities might therefore be a useful way of circumventing individual and cultural variations in what is considered 'risky', while maintaining construct validity.

The IRT – a tool not a toolkit

A number of findings from the present study are also theoretically interesting to the accumulating knowledge of, and debate surrounding what exactly IAT tools are assessing, and how useful they might be in predicting behaviours (Banaji, 2004; De Houwer, 2001; Fazio & Olson, 2003; Rothermond & Wentura, 2001; Rothermund & Wentura, 2005). The conceptual question that lies at the heart of this debate has been facetiously expressed by Fazio *et al.* (2003) as, 'Will the real attitude please stand up?' It does seem that the debate is somewhat mired by this desire to identify a 'real' attitude, rather than seeing explicit and implicit measures as complementary tools that together allow different aspects of the self to be accessed.

With respect to the present study, the IRT-Global's weak to moderate correlations with comparable explicit risk-attitude measures and impression management, combined with its predictive strength, and its uniquely explained positive relationship with optimism, lends credence to the view that implicit attitudes do represent an additional construct, rather than simply another way of measuring the same variables. In addition, the observation of greater method variance, consistent with previous findings (Kim, 2004a), further bolsters the claim of incremental validity on the part of the IRT.

The correlation between the behavioural measure (BART) and the IRT-Global supports the proposal that the predictive utility of implicit tests may lie in their capacity to measure highly automatised, non-conscious, and non-controlled behaviours (Asendorpf *et al.*, 2002; Fazio, 1990). While the IRT-Global did not correlate with its parallel semantic differential task, this explicit measure required responding that is unarguably more conscious and controlled in nature than the less conscious demands of the BART's game-like design, and the IRT-Global. Our finding that the explicit risk

measure was significantly associated with impression management, while neither the IRT-Global nor the BART shared such a relationship supports this perspective. However, it should be kept in mind that the IRT-Global also shared a significant correlation with the Choice Dilemma Questionnaire applied in this study, itself being a measure of conscious attitudes towards risk. This suggests that the IRT may not be singularly restricted to use in predicting automatized risk-taking. Further investigation into the boundary conditions that surround the utility of the IRT is therefore warranted. It seems that the question is not which methodology provides the best prediction of behaviour, which yields the *real* attitude, but rather at what point and for what purpose are the two methodologies best suited.

Limitations and suggestions for future research

While the predictive, convergent and incremental validity of the IRT-Global suggests that the new implicit tool might be a valid predictor of generalized risk-taking behaviours, future studies might seek to establish this predictive capacity in relation to real-life risk-taking behaviours. It is acknowledged that the behavioural measure employed in this study (BART) is a relatively new measure, and while initial data supporting its own validity are strong (Lejuez *et al.*, 2002), the measure is still in its infancy and the stability of its properties still somewhat contentious (Lejuez, Simmons, Aklin, Daughters, & Dvir, 2005). In addition, as has been mentioned, the IRT-Global is a measure of attitude towards risk as a generalized construct, and as such its specificity may be limited. Future research might therefore experiment with adapting the IRT to target specific risk behaviours for its expanded utility.

The low reliability observed between the choice dilemma items used in this study is also of some concern. It is possible that this was affected by the range of risk-domains represented by the items. It would be sensible to seek a replication of the observed group effect using a more robust measure, ideally extending the parameters beyond that of hypothetical choice.

Implications

The present study demonstrated that for males, engaging in risk-behaviours increases within group contexts. We suggest that this phenomenon is in accord with the predictions of social identity theory, with groups of males seeking to subscribe to a perceived gender-role norm. Such a social facilitation of risk-taking is a likely contributor to the disproportionate number of accident fatalities experienced by males (Roads and Traffic Authority of NSW, 2001; WHO, 2002). Intervention programmes seeking to increase awareness of the consequences of risk-behaviours and limit such accidents should therefore endeavour to make young males aware of this social phenomenon and provide them with protective strategies.

Our results also suggest that measuring individual variations in risk-taking propensity within laboratory contexts alone may be misleading. At least in the case of males, it appears that individuals' attitudes towards risky decisions can significantly deviate from their explicitly expressed attitudes when placed in a group context. This finding not only has bearing on the issue of physical accidents resulting from risk-taking, but might also be taken as an argument for the benefits of gender balance within decision making bodies. Increasing gender diversity within predominantly male business and government decision making bodies may help disrupt drifts towards bad decisions arising out of high levels of group cohesion (Janis, 1982).

That both males and females demonstrated negative implicit evaluations of risk, while self-reporting positive appraisals, suggests that although the perception of the risk taking fool might be embedded at a non-conscious level, conscious motivations appear to bolster negative concerns, elevating the status of the risk-taker, particularly in the mind of males, to that of the hero.

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