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The Effects of Risk-Glorifying Media Exposure on Risk-Positive Cognitions, Emotions, and Behaviors: A Meta-Analytic Review

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In recent years, there has been a surge in the quantity of media content that glorifies risk-taking behavior, such as risky driving, extreme sports, or binge drinking. The authors conducted a meta-analysis involving more than 80,000 participants and 105 independent effect sizes to examine whether exposure to such media depictions increased their recipients' risk-taking inclinations. A positive connection was found for overall, combined risk taking (g = .41); as well as its underlying dimensions: risk-taking behaviors (g = .41), risk-positive cognitions and attitudes (g = .35), and risk-positive emotions (g = .56). This effect was observed across varying research methods (experimental, correlational, longitudinal); types of media (video games, movies, advertising, TV, music); and differing risk-related outcome measures (e.g., smoking, drinking, risky driving, sexual behavior). Multiple moderator analyses revealed 2 theoretically new boundary conditions for sociocognitive models. First, the effect was stronger for active (i.e., video games) than for passive (e.g., film, music) exposure to risk-glorifying media content. Second, the effect was stronger when there was a high degree of contextual fit between the media content and type of risk-taking measure. The theoretical, practical, and societal implications of the present research synthesis are discussed.

Keywords: risk taking, risk-glorifying media, media effects, general learning model, meta-analysis

> Hit another car or a wall at high speeds, and you'll be knocked around and disoriented by the Dynamic Crash Effect system.
>
> —Advertisement for the risk-glorifying racing video game *Need for Speed: Shift*

Risk taking and risky behaviors such as reckless driving, having unprotected sex, participating in extreme sports, engaging in binge-drinking, and smoking have long been topics of major interest and concern for both the general public and scientific researchers (e.g., Ben-Zur & Zeidner, 2009; Brown & Witherspoon, 2002; Escobar-Chaves & Anderson, 2008; Strasburger, 1989)—not least because risk-taking behavior is one of the main causes of lethal injuries among children, adolescents, and young adults (Harvey, Towner, Peden, Soori, & Bartolomeos, 2009). For example, reckless driving has received heightened attention due to its role in vehicular collisions. Worldwide, traffic accidents are the main cause of lethal injuries in those between 10 and 24 years old (and constitute 10% of all fatalities in this age group), with many of these accidents being caused by unnecessary risk-taking behaviors such as alcohol consumption, drug use, speeding, illegal street racing, or failing to use seatbelts (Harvey et al., 2009; see also Blows et al., 2005). In 2000, 5.3 million people in the United States were injured (and 41,821 were killed) in traffic accidents, with 27.6 million vehicles being damaged in 16.4 million collisions. This amounts to an economic burden of $230.6 billion, with risky behaviors such as driving while intoxicated and excessive speeding accounting for 22% and 18% of the total economic cost respectively (Blincoe et al., 2002). Similarly alarming statistics can be found for other types of risk-taking behaviors, such as drinking alcohol, having unsafe sex (e.g., Weinstock, Berman, & Cates, 2004), or taking part in extreme sports (Young, 2002). For example, in 2000, the United States registered about 18.9 million estimated new cases of sexually transmitted diseases, with 48% of all infections occurring in people between 15 and 24 years old due to risky sexual practices (cf. Weinstock et al., 2004). In addition, the *2008 Report on the Global AIDS Epidemic* revealed that the number of HIV infections had increased to approximately 33

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million people worldwide in 2007 (Joint United Nations Programme on HIV/AIDS, 2008). Binge drinking (i.e., drinking more than five alcohol units) and smoking are also on the rise in Western countries (Glaeske, Schicktanz, & Jahnsen, 2009); for example, Germany witnessed a doubling in the number of 15- to 19-year-old adolescents being treated for alcohol abuse between 2002 and 2009, and an estimated 20.3% of 11- to 17-year-old German teenagers smoke cigarettes (Lampert, 2008). Also in the United States, risk taking in the form of binge drinking is a problem. For example, Wechsler, Lee, Kuo, and Lee (2000) found that 44% of surveyed American college students reported having engaged in binge drinking during the previous 2 weeks; the U.S. Surgeon General estimated that approximately 5,000 American adolescents younger than age 21 die every year because of alcohol abuse and associated risk taking in road traffic. In sum, risk taking is prevalent in many different forms in society and causes a huge amount of physical and economic costs.

Several sad anecdotal examples strongly suggest that risk glorification in the media is a crucial determinant of increased risk taking in society. For example, premiering in the year 2000, the famous MTV series *Jackass* depicted individuals engaging in risky and potentially self-harming stunts, stirring controversy about reenactments in spite of its long string of disclaimers. This concern appears to have been warranted—a 24-year-old teacher from Carlow, Ireland, copied an onscreen stunt involving racing downhill in a shopping cart and died as a result (Clarkson, 2003); teenagers from both Germany ("Nachahmung kann tödlich enden," 2002) and the United States (Horner, 2002) suffered severe burns after replicating a scene that showed series co-creator and primary actor Johnny Knoxville setting himself on fire. In a similar anecdote, a copy of the EA Games-produced racing videogame *Need for Speed* (which simulates and glorifies reckless driving and illegal street racing) was found in the vehicle of a street racer in Toronto, Canada, after he killed a taxi driver in a car crash (Vingilis & Smart, 2009).

Given these tragically preventable incidents, a growing body of research has been focused on the impact of exposure to risk-glorifying media on both risk-taking inclinations and actual risk-taking behaviors. Several studies have shown a positive connection between exposure to risk-glorifying media content and risk-taking inclinations (e.g., Fischer et al., 2009; Hines, Saris, & Throckmorton-Beltzer, 2000; Kulick & Rosenberg, 2001). However, some researchers have not observed such a connection (e.g., Brown & Newcomer, 1991; Chapin, 2000). In the current meta-analysis, we reviewed and systemized this area of research on the basis of 105 independent effect sizes from more than 80,000 participants, and we provide answers for several currently unresolved theoretical and empirical questions: (a) Is there truly a substantial positive connection between individuals' exposure to risk-glorifying media content and their subsequent risk-taking inclinations? (b) What are the average magnitude, direction, and variability of the effect of risk-glorifying media content on risk-taking inclinations? (c) Are there differences in effect size magnitude among risky behavior, risk-positive cognitions, and risk-positive emotions? (d) Is the risky media effect a causal one, or is it confounded by self-selection and selective media exposure? (e) To what extent is the risky media effect based on priming and learning processes, and can it also be found in longitudinal studies? (f) Are there theoretically relevant situational moderators indicating contextual conditions that might strengthen or weaken the effect?

The last question is especially important for theoretical progress since most prominent explanatory sociocognitive models (i.e., general aggression model/general learning model; Anderson & Bushman, 2002; Buckley & Anderson, 2006) are rather unspecific and thus hard to prove incorrect. Therefore, it is important to identify boundary conditions, which moderate potential media effects. In the present meta-analysis, we examined potential boundary conditions via multiple moderator analyses and tried to answer the following theoretical questions: (a) Do varying types of risk-glorifying media (e.g., music vs. films) lead to different effect size magnitudes? (b) Are different types of risk-taking domains (e.g., personal-health-related risk taking, risk taking in road traffic) more or less likely to be affected by risk glorification in the media? (c) Do active forms of media exposure lead to stronger effects than those that provide passive exposure? (d) Do risk-glorifying media images lead to more risk taking only in the same domain (e.g., images of smoking lead to more smoking) or can a more general carryover effect of risk-glorifying media formats (e.g., images of risky driving may also lead to higher risk taking in economic decision making) be discerned? In the following, we will review the correlational and experimental literature on risk-glorifying media and risk taking, synthesize these effects in a quantitative meta-analysis, and attempt to answer the theoretical questions previously mentioned.

Research on Risk Taking

The Psychological Concept of Risk Taking

In general, risk-taking behavior has been defined as "action (or inaction) that entails a chance of loss" (Furby & Beyth-Marom, 1992, as cited in Ben-Zur & Zeidner, 2009, p. 110). In the current review, we use a definition suggested by Ben-Zur and Zeidner (2009): "Risk taking refers to one's purposive participation in some form of behavior that involves potential negative consequences or losses (social, monetary, interpersonal) as well as perceived positive consequences or gains" (p. 110). Risk taking can occur in various domains, such as motoring (e.g., reckless driving, street racing), unhealthy life choices[1] (e.g., drug taking, alcohol and nicotine consumption), promiscuous sexuality (e.g., engaging in unprotected sex or having a large number of partners), or dangerous extreme sports (e.g., free climbing, motor biking). It is associated with potential harm to both oneself and other people and can occur in different forms, such as physical versus social or implicit (passive) versus explicit (active) varieties (cf. Ben-Zur & Zeidner, 2009). Risky behaviors follow an inverted U-function across the human life span, beginning to occur among young adolescents, increasing during the teenage years, and declining into adulthood (Boyer, 2006).

[1] From an external perspective, most accounts of risk taking label substance abuse as risky behavior (Ben-Zur & Zeidner, 2009). However, there is debate regarding whether people who consume alcohol, nicotine, and/or drugs personally hold this perception. Individuals who use these substances might experience their consumption as a social act with their peers, which is seen as fun and entertaining but not risky.

According to evolutionary accounts, this pattern holds especially true for males, as males signal inclusive fitness to females (who are potential sexual partners) and compete with male rivals (e.g., Byrnes, Miller, & Schafer, 1999). Beyond biological factors, other prominent theoretical accounts for this finding are based on both the influence of situational variables (e.g., Kahneman & Tversky's 1979 prospect theory on decision making under risk) and personality traits (e.g., sensation seeking Zuckerman, 1979; excitement-seeking, Costa & McCrae, 1992). Risk taking has been investigated with various forms of outcome variables, such as actual behavior, self-reported perceptions and intentions of risk, decision making, and risk assessments (cf. Ben-Zur & Zeidner, 2009). Social–cognitive theoretical accounts (e.g., Byrnes et al., 1999) assume that situational variables combine with personal traits to determine an individual's risk-taking inclinations and behaviors. Therefore, risk taking can be motivated by different factors, such as those involving cost–benefit considerations (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008), seeking excitement and adventure, reducing boredom, or seeking pleasurable flow experiences (Ben-Zur & Zeidner, 2009).

Effects of Risk Glorification in the Media

Among many factors believed to affect risk-taking behavior (including genetics, trait variations, gender differences, or special socialization conditions; Byrnes et al., 1999), a growing body of research (cf. Gerrard et al., 2008) suggests that heuristic situational cues—such as risk-glorifying media portrayals—play a crucial role in explaining individuals' risk-taking inclinations and behaviors (cf. American Academy of Pediatrics Committee on Public Education, 2001; Brown & Witherspoon, 2002; Escobar-Chaves & Anderson, 2008; Fischer et al., 2009; Fischer, Guter, & Frey, 2008; Fischer, Kubitzki, Guter, & Frey, 2007; Strasburger, 1989). These media depict different forms of risk taking (such as drinking, smoking, or reckless driving) in a positive light (cf. Fischer et al., 2007). For example, the well-known MTV series *Jackass* portrays young males engaging in dangerous activities, including incautious driving, racing downhill on skateboards, engaging in risky stunts, and self-experimenting with weapons (see Fischer et al., 2008). Former U.S. Senator Joe Lieberman publicly criticized MTV for broadcasting the show after a 13-year-old teenager from Connecticut was seriously injured while trying to copy a stunt featured on it (Lieberman, 2001). Risk-glorifying content is also found in other media formats such as song lyrics (e.g., Ashby & Rich, 2005); car advertisements that promote the racing culture (Vingilis, 1999); depictions of extreme sports such as ski stunts or free climbing (e.g., Fischer et al., 2008); tobacco advertisements (e.g., Biener & Siegel, 2000; Choi, Ahluwalia, Harris, & Okuyemi, 2002); and cinematic portrayals of alcohol consumption (e.g., Ellickson, Collins, Hambarsoomians, & McCaffrey, 2005; Grube, 1993). Most recently, video games featuring simulations of illegal street racing have been criticized for fostering risk-taking inclinations in road traffic situations (Fischer et al., 2009; Kubitzki, 2005, 2006; Vingilis & Smart, 2009).

We conducted a literature search on the relationship between risk-glorifying media and risk-taking inclinations that produced 88 eligible studies. Most were correlational in nature (e.g., Beullens & van den Bulck, 2008; Charlesworth & Glanz, 2005), but there was also an emerging number of experimental explorations (e.g., Fischer et al., 2009; Hines et al., 2000; Potts, Doppler, & Hernandez, 1994). The advantage of correlational field studies is their high ecological validity, which stems from their realistic circumstances; however, they are inconclusive for determining cause and effect. In contrast, the findings of experimental studies can be interpreted on a causal level due to randomization and controlling for potentially confounding variables (such as the self-selection of participants), but many of the studies are conducted under artificial lab conditions that may prohibit the generalization of their outcomes to the real world (see Grabe, Ward, & Shibley-Hyde, 2008). Therefore, the two methods cannot provide unequivocal findings concerning the impact of risk-glorifying media depictions on risk-taking behaviors in isolation but may provide a more comprehensive picture when taken together. Consequently, both methods are combined in the present meta-analysis.

Experimental Research

Researchers in this domain have used experimental methods to test whether exposure to risk-glorifying media causally leads to increased risk-taking inclinations (e.g., Hines et al., 2000; Potts et al., 1994). In a typical experiment, participants are first exposed to media content that either glorifies risk taking—such as pictures of extreme sports (Guter, 2006), video games that simulate street racing (Fischer et al., 2009), or movies with positive portrayals of people who perform risky behaviors (e.g., Hines et al., 2000; Kulick & Rosenberg, 2001)—or does not glorify such behavior. After the experimental manipulation, indicators of risk-taking inclinations or behaviors are measured. Typical indicators used are risk tolerance in road traffic (e.g., Fischer et al., 2007), the accessibility of risk-positive cognitions and emotions (Fischer et al., 2008; Guter, 2006), or personal willingness to take physical risks (Hines et al., 2000; Potts et al., 1994).

Using the experimental paradigm, several authors have repeatedly found that participants exposed to risk-glorifying media content react by demonstrating increased risk-taking inclinations on cognitive, affective, and behavioral levels (e.g., Fischer et al., 2007; Guter, 2006; Hines et al., 2000). These effects have been observed for most types of visual media, including pictures, films, and video games. For example, Fischer et al. (2008) investigated the impact of risk-promoting pictures and film sequences on both risk-promoting cognitions and attitudes toward risk taking. The authors exposed participants to either pictures of high-risk sports (such as free climbing and ski stunts) or neutral images (depictions of flowers and trees). The participants subsequently worked on a word completion task that measured the accessibility of risk-promoting cognitions, and they then indicated their attitude toward risk taking in the context of sports. The results revealed that participants who were exposed to risk-promoting pictures indicated both a higher accessibility of risk-promoting cognitions and a more positive attitude toward risk taking than participants exposed to risk-neutral pictures. Similar effects were found when participants viewed film sequences of sport stunts or the risk-glorifying TV series *Jackass* (see also Guter, 2006).

Similar effects have been observed in the context of health-related behaviors (cf. Ashby & Rich, 2005), such as alcohol consumption. Kulick and Rosenberg (2001) found that individuals who were exposed to movie sequences featuring positive images of drinking had more positive alcohol outcome expectancies than

participants in a control condition who did not view alcohol-positive imagery. These effects have also been found for smoking: Hines et al. (2000) asked participants to rate popular movie actors who had either smoked or not in a viewed film sequence. The authors found that participants who saw the smoking scene reported greater likelihoods of actually smoking in the future than those who had witnessed the nonsmoking equivalent. Similar risk-glorifying media effects have been found for young children. Potts et al. (1994) assigned 6- to 9-year-old children to three different conditions: television programs with frequent portrayals of physical risk taking, programs with infrequent portrayals of physical risk taking, or no TV at all. The children completed a self-report measuring their willingness to take physical risks. In support of a risk-glorifying media effect, the authors found that children who had watched TV programs with frequent risk taking reported higher levels of willingness to take physical risks than those who watched programs with infrequent risk-taking depictions or those who saw none at all.

Finally, these effects have also been demonstrated in context of risk-glorifying video games. A specific subset of driving video games (Fischer et al., 2009; Guter, 2006; Tripp, 2010) simulates illegal street racing in a realistically rendered environment. Fischer et al. (2009) showed that a 20-min session of playing this type of game (compared to non-risk-related games) increased participants' risk-taking inclinations in a subsequent, simulated critical road traffic situation. As a behavioral measure of risk taking, Schuhfried (2006) used as dependent variables the participants' reaction times during the simulation (the Vienna Risk-Taking Test–Traffic, a well-established and standardized measure for behavioral risk taking in road traffic). In addition, further risk-related variables were measured, such as risk-promoting cognitions, risk-related emotions, blood pressure, sensation seeking, and attitudes toward risky driving. In a series of studies, the authors found support for their hypotheses, as individuals who played risk-glorifying racing games experienced more risk-promoting cognitions and emotions, as well as more risk tolerance during the driving simulation. These effects marginally persisted even after a 15-min time gap between participants' playing the game and entering the simulation, and risk-positive tendencies still emerged after a 24-hr lag. In sum, experimental research repeatedly has revealed that risk-glorifying media stimuli increase their consumers' willingness to take risks on a cognitive, affective, and behavioral level.

Correlational Studies: Cross-Sectional and Longitudinal Research

The second class of studies in this domain is ecologically valid correlational research that investigates the relationship between the consumption of risk-glorifying media and risk-taking inclinations and behaviors (e.g., Beullens & van den Bulck, 2008; Gutschoven & Van den Bulck, 2005; Kubitzki, 2005, 2006). Findings obtained in this context indicate that higher levels of exposure to risk-glorifying media are associated with higher levels of risk-taking inclinations and actual risk-taking behaviors. For example, Kubitzki (2005, 2006) found that among 13- to 17-year-old participants ($N = 657$), there was a positive relationship between playing risk-glorifying racing games and underage driving. Similarly, Fischer et al. (2007, Study 1) observed significant positive correlations between the time that participants spent weekly playing risk-glorifying video racing games and self-reported accidents in road traffic in a sample of 16- to 24-year-olds, as well as positive inclinations toward reckless, competitive, and obtrusive styles of driving (for a similar effect, see Temel, 2010).

Furthermore, Beullens and van den Bulck (2008) surveyed 2,194 adolescents and found a positive association between the consumption of risk-glorifying media and positive attitudes toward both risky driving and willingness to take risks in traffic situations (e.g., driving while intoxicated). Similar positive associations between risk-glorifying media exposure and risk-taking inclinations have been found for participants' viewing of images of smoking on television and taking up the habit (Gutschoven & Van den Bulck, 2005); teenagers' self-reports of both their exposure to cigarette advertising and actual smoking behavior (Schooler, Feighery, & Flora, 1996; for similar findings, see also Charlesworth & Glanz, 2005); exposure to alcohol advertising and adolescent alcohol consumption (Unger, Schuster, Zogg, Dent, & Stacy, 2003); and adolescents' exposure to sexual media stimuli and actual risky sexual activity (Pardun, L'Engle, & Brown, 2005).

Longitudinal studies appear to corroborate these findings. For example, Wills, Sargent, Gibbons, Gerrard, and Stoolmiller (2009) took a sample of 961 young adults and found that prior exposure to depictions of alcohol use in movies predicted both alcohol consumption and alcohol-related problems later in life (see also Connolly, Casswell, Zhang, & Silva, 1994). Similar longitudinal effects were found for smoking. In a sample of 2,614 children in Grades 5–8, Wills, Sargent, Stoolmiller, Gibbons, and Gerrard (2008) found that exposure to smoking in movies predicted smoking behavior and inclinations 18 months later (see also Titus-Ernstoff, Dalton, Adachi-Meija, Longacre, & Beach, 2008). Other longitudinal studies have found similar effects for exposure to sex on television and initiation of risky sexual behavior (Collins, Elliott, Berry, Kanouse, Kunkel, Hunter, & Miu, 2004) and for early exposure to alcohol marketing and underage drinking (Collins, Ellickson, McCaffrey, & Hambarsoomians, 2007; see also Ellickson et al., 2005). Overall, both correlational and longitudinal studies seem to support the assumption that there is a considerable positive association between being exposed to risk-glorifying media and subsequent risk-taking inclinations, which occurs both inside and outside the experimental lab.

Mixed Findings

As just noted, the great majority of studies support the assumption that the consumption of risk-glorifying media increases risk-taking inclinations on the behavioral, cognitive/attitudinal, and emotional levels. However, there are also few studies in which such an effect has not been observed. For example, Primack, Land, and Fine (2008) found a positive relationship between smoking-related content in music lyrics and adolescent smoking ($d = 0.35$) but a negative one when the smoking content came from a book ($d = -0.33$). This result indicates the theoretical importance of incorporating moderator analyses into the present meta-analysis, so that the impact of media type can be examined with regard to its effect on recipients' risk-taking inclinations and behaviors. In addition, mixed findings exist with regard to the effect of gender on this relationship. For example, Fischer et al. (2007, Study 3) observed that racing video game consumption was positively associated with heightened risk tolerance in road traffic for male

participants but not for females (for similar, mixed findings regarding gender differences and risk taking as a function of exposure to risk-glorifying media, see Kotch, Coulter, & Lipsitz, 1986; Somers & Tynan, 2006). Further studies demonstrating mixed or null findings have been reported by Brown and Newcomer (1991); Chapin (2000); Fischer et al. (2009, Study 4, observers of racing video games), and Peterson, Moore, and Furstenberg (1991, female sample). In summary, given the existence of mixed findings regarding whether risk-glorifying media affects risk-taking inclinations, we believed that a meta-analysis was warranted to aid us in determining (a) whether a substantial effect exists overall and (b) which variables may moderate its strength and direction.

Theoretical Perspectives on Risky Media Effects

Sociocognitive Models

So far, there has been ample theorizing about why risk-glorifying media affects risk-taking inclinations. Fischer et al. (2009) argued that these effects are based mostly on priming processes for short-term effects and model learning for long-term effects. This speculation has been derived from assumptions in the general aggression model (GAM; Anderson & Bushman, 2002), which is based on social–cognitive models incorporating social learning (Bandura, 1986), social information processing (Dodge & Crick, 1990), the social–cognitive model of media violence (Huesmann, 1986), the excitation transfer model (Zillmann, 1983), and the cognitive neoassociationist model (Berkowitz, 1984). These models were mainly applied to explain the impact of antagonistic media content on aggressive cognitions, emotions, and behaviors from both short- and long-term perspectives (for a recent review on media violence, see Anderson et al., 2010).

With regard to short-term effects, the main explanation of media violence effects provided by these models is that aggressive media content triggers aggressive ideas, which prime other, semantically related thoughts and cognitions in turn (Berkowitz, 1984). In this rationale, cognitions, emotions, and behavioral scripts are assumed to be organized as neuronal networks in the cognitive system (e.g., Collins & Loftus, 1975). As a consequence, the activation of a specific concept leads to the activation of related notions in the cognitive system via associative pathways. For example, aggressive media content may activate the concept of aggression and thus increase the cognitive accessibility of cognitions, emotions, and behavioral scripts related to it (Bower, 1981). In turn, this heightens the likelihood that an individual will demonstrate aggressive behavior within his or her actual social environment (Anderson & Bushman, 2002). In contrast to the priming-based explanation of short-term effects, the GAM explains long-term media effects via learning processes that commence when individuals are repeatedly exposed to violent media (Anderson et al., 2010). In other words, the recurring consumption of violent media rehearses and thus chronically activates aggressive cognitions, emotions, beliefs, knowledge structures, and behavioral scripts.

More recently, Buckley and Anderson (2006) extended the GAM into the general learning model (GLM) in order to widen its focus beyond just aggression. As with the GAM, the GLM proposes that specific personal and situational input variables trigger related behavioral responses by activating internal psychological factors (such as cognitions, emotions, and arousal), but it differs in attempting to explain general effects of media exposure on behavior (and is thus not restricted solely to exploring the impact of media violence). There is initial evidence for the predictive validity of the GLM's broader scope. For example, exposure to video games (Greitemeyer & Osswald, 2009, 2010) and music (Greitemeyer, 2009a, 2009b) with prosocial content appears to increase prosocial cognition and affect, which in turn evokes prosocial behavior. Thus, it can be hypothesized that exposure to risk-glorifying media may activate risk-positive cognitions and emotions related to risk taking, which consequently elicit risky behavior—which would provide further empirical support for this more general model of media effects.

Several studies conducted by Fischer and colleagues have revealed that the effect of risk-glorifying media on risk-taking cognitions, emotions, and behaviors works similarly to the impact of media violence on aggression. For example, Fischer et al. (2008) found that the effect of risky media exposure on risk taking in decision making was mediated by the increased accessibility of risk-positive cognitions. More relevant from a learning perspective, in another study, Fischer et al. (2009) observed that the risk-promoting effect of racing video games on risk taking in road traffic was mediated by changes in the player's self-concept. Individuals who played this subtype of video game perceived themselves to be reckless drivers (and evaluated reckless driving more positively) significantly more than players of risk-neutral video games. In turn, this effect mediated the connection between playing racing games and risk taking in road traffic. Most recently, Fischer, Heene, Temel, and Bühner (2010) examined a sample of more than 300 school students and found that the positive association between exposure to risk-glorifying media and self-reported risk-taking behavior was mediated by an increased intention to take risks (i.e., model learning), as opposed to desensitization to identifying risky behavior. That is, the more students reported consuming risk-glorifying media content, the more they intended to demonstrate the specific behaviors they were exposed to, which then led to increased self-reports of actual risk-taking behaviors (see also Temel, 2010). In sum, risk-glorifying media depictions have been shown to affect actual risk taking via a variety of psychological processes suggested by the GAM and the GLM, including the increased accessibility of risk-positive cognitions (priming), changes in the self-concept (see also Gentile & Gentile, 2008; Todorov & Bargh, 2002), and model learning (Bandura, 1968).

Criticism of Media Effects and Underlying Sociocognitive Mechanisms

Critics of media violence research (such as media industry lawyers, enthusiastic consumers of violent or risk-glorifying media, or other researchers, e.g., Ferguson & Kilburn, 2010) argue that most research findings on media violence are either irrelevant or confounded by a selective exposure effect. It is argued that the consumption of violent or risk-glorifying media does not lead causally to increased levels of aggression or risk taking but is instead due mainly to self-selection processes. According to this perspective, individuals who are a priori higher in levels of aggression or risk seeking are more likely to consume media that positively depict these behaviors. With the present meta-analysis, we provide further answers to the question of whether media

effects are causal or spurious by (a) including experimental evidence on the effects of risk-glorifying media on risk-taking behaviors and inclinations, (b) controlling for potential moderators, and (c) outlining correlational studies that showed this effect even when potential confounding variables such as trait sensation seeking were controlled. A second criticism of media violence research is that the risk-taking measures used in most lab studies are too artificial to be confidently compared with real-life aggression or risk taking. Thus, in the present research, we distinguish between field and lab studies, as well as between actual risk-taking behaviors and more indirect measures of risk-taking cognitions, attitudes, beliefs, and emotions.

Overview of the Present Meta-Analysis: Theoretical and Empirical Contributions

Magnitude and Causality of the Risk-Glorifying Media Effect

Although there is considerable experimental, correlational, and longitudinal research on the impact of risk-glorifying media content on risk-taking inclinations, there are still key theoretical and empirical questions that need to be answered. First of all, in the present synthesis, we estimated the magnitude of risk-glorifying media effects on risky behavior, risk-positive cognitions, and risk-positive emotions. This was warranted considering that there are also weak or null effects existent in the literature (e.g., Fischer et al., 2007, Study 3, female sample; Somers & Tynan, 2006).

Second, in the present meta-analysis, we could determine whether the expected effect was a causal one or whether it was diluted by potential confounders such as self-selection and selective exposure. There is considerable debate among researchers on violent media about whether most of the variance of this effect is explained by the idea that naturally aggressive people might be more likely to expose themselves to violent media. The same issue is at stake in research on risk-glorifying media. We addressed this problem in two different ways: (a) We located a fair number of experimental studies in which randomization was used and thus would be less likely to be affected by confounding variables, and (b) we additionally analyzed correlational studies, in which potential confounders were controlled.

Differences in Type of Media and Type of Risk-Taking Outcomes

In media research, investigators must ask whether there are specific situations related to the different types of media and different risk-taking outcomes that moderate the magnitude of the hypothesized effect. Given that researchers in this field have employed a variety of risk-glorifying media stimuli (video games, music, TV ads, movie sequences, pictures, and so forth), used different types of risk-taking domains as dependent variables (e.g., driving, alcohol and drug consumption, smoking behavior, sexual behavior, and decision making), and measured risk-taking inclinations on different psychological levels (i.e., risk-positive cognitions, risk-promoting affect, and actual risk-taking behavior), a meta-analysis is needed for these findings to be processed and generalized conclusions to be made. For example, do risk-glorifying video games have a stronger impact than movies? Does it matter whether a risk-positive message is promoted in context of song lyrics or commercial advertising? Moreover, is the effect of risk-glorifying media content stronger for health related risk taking (e.g., drinking alcohol, smoking), risk taking in road traffic, or sexual risk taking? We clarified these questions in the present analysis by explicitly coding the types of risk-glorifying media formats used as well as the risk-taking outcomes.

The Process of Media Consumption: Active Versus Passive Media Exposure

Theoretically crucial and related to the latter point, we explicitly investigated whether active (i.e., playing video games) versus passive (i.e., watching a video game as well as all other types of media, such as TV and music) exposure to risk-glorifying media would differentially affect the magnitude of its effect on risk taking. We expected that the active media exposure that participants received through playing a risk-glorifying video game would lead to larger effect sizes than the passive media exposure provided by watching other people play video games or by watching other types of media such as TV or music. Actively playing video games has a variety of unique implications for the self and associated learning processes (cf. Fischer, Kastenmüller, & Greitemeyer, 2010; Gentile & Gentile, 2008), which elevates the psychological and behavioral effects of media exposure. For example, in contrast to passive media consumption, video games create an immersive environment by requiring the player to engage in active decision making, take control of the game's character, and dispense physical effort by pressing buttons on a controller. Video game play also allows the player to continuously practice skills, set specific goals for success, and receive immediate feedback about his or her game performance (which leads to increased feelings of self-esteem and self-competence). These processes lead to an effect called *overlearning*, which is characterized by automation of the game-related knowledge (e.g., risk taking or aggression; see Gentile & Gentile, 2008).

Moreover, video games lead to increased identification with the media content, because players directly control a game character, which can be sometimes even be fashioned after their personal physical attributes (Fischer, Kastenmüller, et al., 2010; Konijn, Nije Bijvank, & Bushman, 2007). For example, Fischer, Kastenmüller, et al. (2010) found that the players of an aggressive video game reacted significantly more aggressively toward another participant when they played with a personally customized game character (physically modeled after themselves) than when they played with a default game character. Further support for this assumption has been provided by Fischer et al. (2009, Study 4), who found that actively playing a risk-glorifying racing video game led to a stronger effect on subsequent risk taking than just watching another person play the same game. By coding active versus passive media consumption as a potential moderator, we tried in the present meta-analysis to answer whether active exposure to risk-glorifying media indeed results in larger effects on risk taking than passive exposure.

Underlying Psychological Mechanisms

In the current meta-analysis, we examined whether the effect of risk-glorifying media content and risk taking is based predomi-

nantly on priming or (model) learning. The GAM and the GLM postulate two different processes by which media effects can occur: Short-term effects are based mainly on priming processes (i.e., activation of risk-positive cognitions, emotions, and behavioral scripts), whereas long-term effects are mainly based on processes of (model) learning. In order to see which account would be the most probable explanation for the risk-taking media effect, we included both cross-sectional and longitudinal studies and compared the magnitude of effect sizes between both types of research designs.

Based on the formulations of the GAM and the GLM about the psychological routes of media effects, we also used the present meta-analysis to clarify whether risk-glorifying media content has similar effects in both direction and magnitude on (a) risky behaviors, (b) risk-positive cognitions and attitudes, and (c) risk-positive emotions and arousal. For example, is the effect larger for risk-glorifying behaviors, cognitions, or emotions? Are potential effects on these three variables moderated by different situational factors? These questions could be answered by the following research synthesis.

Finally, we examined whether an individual's risk-taking behavior is simply a reproduction of what he or she has been exposed to in media with risk-glorifying content or whether the effects of risk-glorifying media generalize to other domains of risk-taking behavior. To address these notions, we coded the specificity between risk-taking media format and risk-taking outcome—that is, whether type of media and type of risk-related outcome corresponded contextually or not (see also Bandura, 1968). We predicted that high contextual fit (e.g., glorification of smoking as media stimulus and smoking as risk-taking outcome) would yield larger effects on risk-taking outcomes than would low contextual fit (e.g., glorification of reckless driving as media stimulus and risk tolerance in economic decision making as outcome variable). However, even given low contextual fit, we predicted a general carryover effect of risk-glorifying media stimuli to contextually distinct areas of risk taking, suggesting that individuals actively process the content to which they are exposed.

In sum, we had two major objectives in the current meta-analytic synthesis: (a) to assess the average magnitude, direction, and variability of the effect of risk-glorifying media content on risk-taking behaviors, cognitions, and emotions and (b) to identify theoretically relevant situational moderators indicating which boundary conditions might strengthen or weaken the effect (i.e., type of media, type of risk-taking outcome, active vs. passive media consumption, and correspondence between media stimulus and risk-taking response).

Method

Sample of Studies

We used various methods to gather relevant research reports. First, literature searches were conducted in the following databases: PsycInfo, Educational Resources Information Center (ERIC), PubMed, PsychSpider/ZPID (a database for German language publications), PSYNDEX, Dissertation Abstracts International, and Google Scholar. The following keywords were entered as part of the search: *risk*, media, TV, movie, game, Internet, mass media, advertis*, pictures, music, smoking, alcohol, racing, traffic, sex*, drug, pregnancy, sexually transmitted diseases,* and *delinquency*.[2] Excluded search words were: *aggress*, violen*, suicide (ideation), (restrained/disordered) eating, school failure, dropping out,* and *news**. Second, we contacted well-established media researchers directly to obtain unpublished studies and reference lists that could be examined for further eligible studies; we also contacted researchers via the e-mail lists of the Society for Personality and Social Psychology and European Association of Social Psychology. Finally, the reference lists of book chapters and review articles on risk taking and media effects were also investigated and used as links to additional research.

Selection Criteria

Two research assistants conducted the literature search in conjunction with Anne Sauer.[3] Abstracts were inspected, and reports were excluded if the research (a) was not written in English or German; (b) contained no empirical study or no reporting of original data (e.g., interviews, theoretical considerations on risk taking or reanalysis of previous data; American Academy of Pediatrics Committee on Public Education, 2001; Dal Cin et al., 2009; Escobar-Chaves & Anderson, 2008; Hill, Thomsen, Page, & Parrott, 2005; Johnston Polacek, Rojas, Levitt, & Mika, 2006); (c) had no relevant measure of risk-taking inclinations or behaviors (e.g., Aitken, Eadie, Leathar, McNeill, & Scott, 1988; Garfield, Chung, & Rathouz, 2003; Kunkel, Cope, & Biely, 1999; Roberts & Foehr, 2008); (d) had no relevant measure of exposure to risk-glorifying media content (e.g., Buchanan & Lev, 1989; Eaton et al., 2006; Unger, Johnson, & Rohrbach, 1995); (e) was conducted with a clinical participant sample (such as people who had previously attempted suicide; Berman, 1988); (f) did not have risk-glorifying media content as its stimulus (e.g., antitobacco advertisements; Lee & Ferguson, 2002; Loukas, Murphy, & Gottlieb, 2008; Moyer-Guse, 2008; Tyler & Cook, 1984); (g) did not principally focus on risk-glorifying media content (such as those on media violence and aggression); (h) did not include risk-glorifying pictures, films, music, video games, advertisements, or TV programs (e.g., Griffiths, 2005; Lasorsa & Shoemaker, 1988); (i) did not focus on one of the classic risk-taking domains, such as risky driving, smoking, drug consumption, alcohol consumption, gambling, delinquency, or sexual risk taking (thus excluding those on aggression, suicide, eating behavior, body perception, or skipping school, e.g., Ata, Ludden, & Lally, 2007; Robinson, 1999; Scheel & Westefeld, 1999; Vandewater, Shim, & Caplovitz; 2004); (k) included neuropsychological methods (Brewer-Smyth, 2006; Brewer-Smyth, Burgess, & Shults, 2004); (l) did not provide sufficient statistical data to compute an effect size (or where we received no response from the researchers who were contacted for additional statistical data); (m) did not use risk-glorifying but rather risk-negative media depictions (e.g., antitobacco advertisement); and (n) merely assessed the relationship between media exposure and risk taking with path analytical procedures, because no clearly comparable effect size indicators were provided (e.g.,

[2] Words marked with an asterisk (*) were searched for with different suffixes.

[3] We thank Martina Kainbacher and Magdalena Wicher for their great help in study coding.

Tickle, Hull, Sargent, Dalton, & Heatherton, 2006; Wyllie, Zhang, & Casswell, 1998).

Measurement of Risk Taking

The literature review was grouped according to three different outcome variables: risk-positive cognitions, risk-positive affect, and risk-taking behaviors. Only one study was found on the effects of risk-glorifying media on arousal (Fischer et al., 2009, Study 4), so this variable could not be considered in the meta-analysis. Instead, arousal was incorporated into the pre-existing category of risk-promoting emotions.

In some of the selected studies, more than one outcome measure within each category was used; thus, we computed effect sizes for each subdimension separately and then averaged them into a single overall effect size for each of the three outcome measures. With regard to risk-positive cognitions, measures were employed for the cognitive accessibility of risk-positive cognitions (e.g., Fischer et al., 2008); attitudes toward risky behaviors and risk taking (such as sexual attitudes; Chapin, 2000; Straub, Hills, Thompson, & Moscicki, 2003); and intentions to make risky decisions (Fischer et al., 2008). Measures of risk-positive emotions were feelings of thrill and excitement (e.g., Guter, 2006), as well as sensation seeking (Fischer et al., 2009). Finally, risk-taking behaviors were measured via risk taking in settings close to reality: for example, reaction time tasks in the context of critical road traffic situations (see Fischer et al., 2007), actual risky decision making (Tripp, 2010), or (self-reported) actual risk-taking behavior (e.g., smoking and drinking alcohol; Martino et al., 2006; Schooler et al., 1996).

Measurement of Media Use

Our main aim in the meta-analysis was to directly test the connection between exposure to risk-glorifying media content and subsequent risk-taking inclinations. Therefore, we incorporated into the final sample only those studies in which actual media use or exposure (either via self-report or experimental manipulations) were assessed. Experimental studies were used when they contained both an experimental group (with direct manipulations of exposure to risk-glorifying media content) and a control group (without exposure to risk-glorifying media content or without any media exposure at all). In correlative designs, two different measurements of media use were generally utilized. Participants were asked either how often they consumed a specific type of media (e.g., X-rated films) and/or general media use during a specific time frame (e.g., Wingood et al., 2001) or if they knew of specific types of risk-glorifying media (which were judged to be risk-glorifying by experts) and the extent to which these media formats contained risk-glorifying content (such as images of smoking or drinking; e.g., Sargent et al., 2005).

Coding and Analysis of Potential Moderators

A meta-analysis gives researchers an opportunity to identify potential moderators, which are variables that determine whether specific characteristics of the study, subpopulations of the participant sample, or specific psychological processes systematically affect the magnitude of the obtained mean effect size. In testing, we first explored whether each study's total heterogeneity was significant. If it was, we performed further statistical analyses to partition the variance among the observed effect sizes (for a similar procedure in a meta-analysis on media and body image, see Grabe et al., 2008). We coded seven different categorical variables and then tested them to see whether they moderated the magnitude of the association between exposure to risk-glorifying media stimuli and risk-taking inclination: (a) type of study design (experimental vs. correlational vs. longitudinal); (b) the type of media used as the risk-glorifying stimulus (video games vs. movies and television vs. advertisements with pictures and magazines vs. music vs. "miscellaneous" category with general, unspecific media consumption); (c) type of risk-related outcome variable (risky driving, alcohol and drug consumption, smoking, sexual behavior, and miscellaneous category including gambling and delinquency); (d) active (e.g., playing video games) versus passive media exposure (e.g., watching someone else play a video game as well as exposure to other types of media such as TV and music); (e) fit between the type of study and outcome variable (so we could control whether the effects of risk-glorifying media on risk-taking inclinations were domain specific or carried over to other, more psychologically distinct areas of risk taking; this was assessed as low, moderate, or high. In subsequent analyses, the low and moderate categories were collapsed. For example, fit would be assessed as low in a paradigm where participants are exposed to extreme sports and subsequently indicate their intention to smoke or consume alcohol, and fit would be assessed as high if participants play a racing game and proceed to have their proclivity for risky driving measured); (f) age (Group 1: younger than 16 years; Group 2: 16–24 years; Group 3: older than 24 years); and (g) sex of participants.[4] Anne Sauer and Claudia Vogrincic coded all of the moderators, with a research assistant double-coding 60% of them. There was more than 95% agreement among the three coders with regard to study design, type of media stimulus, type of risk-taking behavior reported, and fit between types of media stimulus and types of risk-taking inclination, with the remaining inconsistencies being resolved by discussion.

Final Sample of Studies

The present meta-analysis was based on 331 single-coded effect sizes, which led to a final sample of 105 independent effect sizes drawn from 88 empirical studies, incorporating more than 80,000 participants. Furthermore, the present analysis incorporated 81 independent effect sizes for risk-taking behavior (i.e., observed and self-reported actual behavior; see Table 1), 47 independent

[4] Although we tended to find slightly stronger (but not significant) effects for male ($g = .25$) than female ($g = .18$) participants, we toned this down in the Results section of the present meta-analysis for several reasons. First, we found a gender difference in only one experimental study (Fischer et al., 2007, Study 3). Second, in correlational studies, the variance of the predictor variable partially affects the effect size magnitude of the criteria variable. For example, we know from media violence research that the variance in violent media exposure is greater for men than women, which leads to larger effects for men than women even though the slopes connecting media exposure to aggressive responses are virtually identical. A similar situation can be expected in the domain of exposure to risk-glorifying media and risk taking (we thank an anonymous reviewer for this important point).

Table 1
Effect Size Estimates of Risk-Taking Behavior

Study	Sample	*g*	*N* E	*N* C	*N* S	Mean age (years)	Study design	Media type	Dependent variable	Fit: Stimulus response
Altman et al. (1996)	Full sample	0.880	173	718		<16	Corr	Ads	Behavior (smoking)	High
Anderson & Dill (2000)	Full sample	0.841			226	16–24	Corr	Games	Behavior (c)	High
Arnett (1991)	Female	0.228	105	30		16–24	Corr	Music	Behavior (c)	Low
	Male	0.539	54	56		16–24	Corr	Music	Behavior (c)	Low
Ashby & Rich (2006)	Disapproval	0.203	1,748	1,748		<16	Long	Movies	Behavior (sex)	Low
	No disapproval	−0.101	666	626		<16	Long	Movies	Behavior (sex)	Low
Atkin (1989)	Full sample	0.368			665	<16	Corr	Ads	Behavior (alcohol) (c)	Low
Atkin et al. (1984)	Sample 1	0.493			332	16–24	Corr	Ads	Behavior (alcohol)	Low
	Sample 2	0.569			332	16–24	Corr	Ads	Behavior (alcohol) (c)	Low
Atkin et al. (1983)	Full sample	0.583			1,227	16–24	Corr	Ads	Behavior (alcohol) (c)	Low
Banerjee et al. (2009)	Full sample	0.270			773	16–24	Corr	Movies	Behavior (c)	Low
Beullens et al. (2008)	Full sample	0.699			2,193	16–24	Corr	Games	Behavior (traffic)	High
Biener & Siegel (2000)	Full sample	0.761			1,058	16–24	Long	Ads	Behavior (smoking)	High
Botvin et al. (1993)	Full sample	1.153			602	<16	Corr	Ads	Behavior (smoking)	High
Brown & Newcomer (1991)	Full sample	0.000			242	<16	Long	Movies	Behavior (sex)	Low
Brown et al. (2006)	Black	0.255			526	<16	Long	General	Behavior (sex) (c)	Low
	White	0.515			491	<16	Long	General	Behavior (sex) (c)	Low
Carson et al. (2005)	Full sample	0.251			967	16–24	Corr	General	Behavior (smoking)	High
Chapin (2000)	Full sample	−0.071			162	<24	Corr	General	Behavior (c)	Low
Choi et al. (2002)	Full sample	0.279			644	16–24	Long	Ads	Behavior (smoking)	High
Collins et al. (2007)	Full sample	0.364			1,664	<16	Long	Ads	Behavior (alcohol)	High
Collins et al. (2004)	Full sample	0.137			1,581	<16	Long	Movie	Behavior (sex)	High
Dalton et al. (2003)	Full sample	0.802			2,603	<16	Long	Movies	Behavior (smoking)	High
Delfabbro et al. (2009)	Full sample	0.277			2,669	<16	Corr	Games	Behavior (gambling)	High
Derevensky et al. (2010)	Full sample	0.272			1,147	16–24	Corr	Ads	Behavior (gambling)	High
Distefan et al. (2004)	Full sample	0.286			1,563	<16	Long	Ads	Behavior (smoking)	High
Fischer et al. (2009)										
Study 1	Full sample	0.572	18	16		<24	Exp	Games	Behavior (traffic)	High
Study 2	Full sample	0.766	16	15		16–24	Exp	Games	Behavior (traffic)	High
Study 3	Full sample	0.250	19	16		<24	Exp	Games	Behavior (traffic)	High
Study 4	Observers	0.065	16	15		<24	Exp	Games	Behavior (traffic)	High
	Players	0.715	14	13		<24	Exp	Games	Behavior (traffic)	High
Fischer et al. (2008; Study 2)	Full sample	1.354	48	22		16–24	Exp	Movies	Behavior (traffic) (c)	Low
Fischer et al. (2007)										
Study 1	Female	0.273			92	<24	Corr	Games	Behavior (traffic) (c)	High
	Male	0.524			106	<24	Corr	Games	Behavior (traffic) (c)	High
Study 3	Female	−0.491	19	20		16–24	Exp	Games	Behavior (traffic)	High
	Male	0.865	14	15		16–24	Exp	Games	Behavior (traffic)	High
Gidwani et al. (2002)	Full sample	0.409			592	<16	Long	Movies	Behavior (smoking)	Low
Gunther et al. (2006)	Full sample	0.516			818	<16	Corr	General	Behavior (smoking)	High
Gutschoven & Van den Bulck (2005)	Full sample	0.259			909	<16	Corr	Movies	Behavior (smoking)	Low
Hanewinkel et al. (2008)	Full sample	0.242			2,110	<16	Long	Movies	Behavior	High
Hanewinkel & Sargent (2008)	Full sample	0.497			2,711	<16	Long	Movies	Behavior (smoking)	High
Hanewinkel et al. (2009)	Full sample	0.686			2,708	<16	Long	Movies	Behavior (alcohol) (c)	High
Hanewinkel et al. (2007)	Full sample	1.026			5,581	<16	Corr	Movies	Behavior (alcohol) (c)	High
Henriksen et al. (2008)	Full sample	0.543			720	<16	Long	Ads	Behavior (alcohol)	High
Hunt et al. (2009)	Full sample	0.090			1,006	16–24	Corr	Movies	Behavior (smoking)	High
Islam & Anderson Johnson (2007)	Full sample	0.403			1,930	16–24	Corr	General	Behavior (smoking) (c)	High
Kim et al. (2010)	Full sample	−0.139			945	16–24	Corr	General	Behavior (c)	Low
Kohn et al. (1984)	Full sample	−0.265	110	53		>24	Exp	Ads	Behavior (alcohol)	High
L′Engle et al. (2006)	Full sample	0.208			1,011	<16	Corr	General	Behavior (sex) (c)	Low
Lo & Wei (2005)	Full sample	0.723			2,001	<16	Corr	General	Behavior (sex)	High
Martino et al. (2006)	Full sample	0.211			981	16–24	Long	Music	Behavior (sex) (c)	High
Martino et al. (2005)	Full sample	0.206			632	<16	Long	Movies	Behavior (sex)	High
Pardun et al. (2005)	Full sample	0.201			1,074	<16	Corr	General	Behavior (sex) (C)	High
Perry et al. (2007)	Full sample	0.338			307	>24	Corr	General	Behavior (sex) (C)	High
Peter & Valkenburg (2008)	Full sample	0.324			2,343	16–24	Corr	General	Behavior (sex)	High
Peterson et al. (1991)	Female	−0.040			171	<16	Long	Movies	Behavior (sex)	Low
	Male	0.000			172	<16	Long	Movies	Behavior (sex)	Low
Pierce et al. (1998)	Full sample	0.549			876	16–24	Long	Ads	Behavior (smoking)	High
Primack et al. (2006)	Full sample	0.314			1,211	<16	Corr	General	Behavior (smoking) (c)	Low
Primack et al. (2009)	Full sample	0.511			1,034	<16	Corr	General	Behavior	Low
Primack et al. (2008)	Full sample	0.206			1,138	<16	Corr	General	Behavior (smoking)	Low

(*table continues*)

Table 1 (*continued*)

Study	Sample	*g*	*N* E	*N* C	*N* S	Mean age (years)	Study design	Media type	Dependent variable	Fit: Stimulus response
Sargent et al. (2001)	Full sample	0.921			4,919	<16	Corr	Movies	Behavior (smoking)	High
Sargent et al. (2000)	Full sample	0.948			480	<16	Long	Ads	Behavior (smoking)	High
Sargent et al. (2005)	Full sample	0.974			6,522	<16	Corr	Movies	Behavior (smoking)	High
Schooler et al. (1996)	Full sample	0.218			565	<16	Corr	Ads	Behavior (smoking)	High
Somers & Tynan (2006)	Female	0.000			253	16–24	Corr	Movies	Behavior (sex) (c)	High
	Male	0.113			196	16–24	Corr	Movies	Behavior (sex) (c)	High
Stacy et al. (2004)	Full sample	0.157			2,250	<16	Long	Movies	Behavior (alcohol) (c)	Low
Supper (2010)	Female	0.795	22	20		16–24	Exp	Music	Behavior	Low
	Male	0.328	22	20		<24	Exp	Music	Behavior	Low
Temel (2010)	Female	0.895			184	<16	Corr	General	Behavior	Low
	Male	1.001			117	<16	Corr	General	Behavior	Low
Thomsen & Revke (2006)	Full sample	0.628			392	<16	Corr	Movies	Behavior (alcohol)	Low
Took & Weiss (1994)	Full sample	0.481	48	39		<16	Exp	Music	Behavior (c)	Low
Tripp (2010)	Female	0.737			43	<24	Exp	Games	Behavior	Low
	Male	0.354			39	<24	Exp	Games	Behavior	Low
Tucker, L. (1985)	Male	0.348	72	71		<16	Corr	Movies	Behavior (alcohol)	Low
Wills et al. (2009)	Full sample	0.583			961	<16	Long	Movies	Behavior (alcohol)	High
Wills et al. (2008)	Full sample	0.494			4,932	<16	Long	Movies	Behavior (smoking)	Low
Wills et al. (2007)	Full sample	0.561			2,614	<16	Long	Movies	Behavior (smoking)	High
Wingood et al. (2001)	Female	0.332			522	16–24	Corr	Movies	Behavior (sex) (c)	High

Note. A positive *g* (point estimate) indicates a positive relationship between risk-glorifying media exposure and risk-taking inclination. *N* = sample size; E = experimental condition; C = control condition; S = survey study; Exp = experimental design; Corr = correlational design; Long = longitudinal design; (c) = combination of two or more effect sizes.

effect sizes for risk-positive cognitions and attitudes (e.g., increased cognitive accessibility of risk-positive cognitions; see Table 2), and 15 independent effect sizes for risk-positive emotions and arousal (e.g., feelings of being thrilled or excited; see Table 3).

Calculation of Effect Sizes

Suggested by Hedges and Becker (1986), the effect size *g* was used in the analysis. All effect sizes were computed via the professional program Comprehensive Meta-Analysis (Borenstein, Hedges, Higgins, and Rothstein, 2005; Version 2.2.048). If means and standard deviations were reported, we computed *g* by subtracting the mean for risk-taking inclination of people who were exposed to non-risk-glorifying media content from the mean of people who were exposed to risk-glorifying media content and divided the resulting difference by the pooled within-group standard deviation. Positive values thus indicated higher levels of risk-taking inclination as a function of exposure to risk-glorifying media content. Where possible, we preferred means and standard deviations as well as correlations in computing effect sizes. In all other cases, we used *t*, *F*, or *p* values to estimate *g* (for the formulae, see Hedges & Becker, 1986). Within the sample of correlational studies, *g* was calculated from *r* (for the formulae, see Hedges & Becker, 1986).

Studies where Hedges's *g* was not exactly computable with our statistics program (and where more detailed data could not be obtained by contacting the authors) were excluded from the final analyses. Please note that studies measuring more than one class of dependent measure were used separately. For example, if both risk-taking behavior and risk-promoting cognitions were assessed in one study, effect sizes were obtained for both of the analyses. If a specific outcome variable was measured with more than one indicator, those employed were averaged into one overall indicator. The number of samples (*k*), Hedges's *g* as weighted effect size (cf. Hedges & Vevea, 1998), the 95% confidence intervals (CIs) for Hedges's *g*, and the homogeneity statistic (Q_T) were reported.

Results

Strategy of Analysis

We conducted four separate, different meta-analyses for (a) overall risk-taking inclination (risk-taking behaviors, risk-positive cognitions and attitudes, and risk-positive emotions; $N = 105$ independent effect sizes); (b) risk-taking behavior (actual and self-reported risk-taking behaviors; $N = 81$ independent effect sizes); (c) risk-positive cognitions and attitudes (implicit and explicit measures of risk-positive cognitions; $N = 47$ independent effect sizes); and (d) risk-positive emotions and arousal ($N = 15$ independent effect sizes). We report the point estimates, confidence intervals, and tests against zero. Moreover, we conducted homogeneity tests (Q). If these tests were significant, we conducted further moderator analyses. We employed fixed effect models for all of the following analyses in order to provide estimates of within-group heterogeneity, although random effects models resulted in rather similar findings (for the same analysis procedure in the area of media violence, see Anderson et al., 2010).

Meta-Analysis 1: Mean Effect Sizes for Overall Risk-Taking Inclination (Combined Behavior, Cognition, and Emotion)

For an overview, see Table 4. The weighted mean effect size (point estimate) over 105 independent effect sizes was .41 for the fixed effects model (95% CIs [0.39, 0.42], $SE = .008$, $Z = 52.29$, $p < .001$) and .42 for the random effects model (95% CIs [0.37,

Table 2
Effect Size Estimates of Risk-Positive Cognitions/Attitudes

Study	Sample	*g*	*N*			Mean age (years)	Study design	Media type	Dependent variable	Fit: Stimulus response
			E	C	S					
Aitken & Eadie (1990)	Full sample	0.452			627	<16	Corr	Ads	Cognition (smoking)	High
Anderson & Dill (2000)	Full sample	0.422			226	16–24	Corr	Games	Attitude (c)	High
Ausweger (2010)	Female	0.322	26	26		16–24	Exp	Music	Cognition (c)	Low
	Male	0.708	28	25		16–24	Exp	Music	Cognition (c)	Low
Bahk (1997)	Full sample	0.565	70	70		16–24	Exp	Movies	Cognition (alcohol)	High
Bahk (2001)	Full sample	0.572	73	74		16–24	Exp	Movies	Cognition (alcohol)	High
Beullens & Van den Bulck (2008)	Female	0.022			764	16–24	Corr	Movies	Cognition (traffic) (c)	Low
	Male	0.150			1,430	16–24	Corr	Movies	Cognition (traffic) (c)	Low
Collins et al. (2007)	Full sample	0.289			1,664	<16	Long	Ads	Cognition (alcohol)	High
Fischer et al. (2009)										
Study 2	Full sample	0.879	16	15		16–24	Exp	Games	Cognition (traffic)	High
Study 3	Full sample	0.297	19	16		<24	Exp	Games	Cognition (traffic)	High
Study 4	Observers	0.612	16	15		<24	Exp	Games	Cognition (traffic) (c)	High
	Players	0.597	14	13		<24	Exp	Games	Cognition (traffic) (c)	High
Fischer et al. (2008)										
Study 1	Full sample	2.563	42	22		16–24	Corr	Ads	Cognition	High
Study 3	Full sample	0.852	48	22		16–24	Exp	Games	Cognition (c)	Low
Fischer et al. (2007)										
Study 1	Female	0.578			92	<24	Corr	Games	Cognition (traffic)	High
	Male	0.973			106	<24	Corr	Games	Cognition (traffic)	High
Study 2	Female	0.533	17	19		16–24	Exp	Games	Cognition (traffic)	High
	Male	0.397	27	20		16–24	Exp	Games	Cognition (traffic)	High
Study 3	Female	0.140	19	20		16–24	Exp	Games	Cognition (traffic)	High
	Male	1.078	14	15		16–24	Exp	Games	Cognition (traffic)	High
Fischer et al. (2010)										
Study 1	Full sample	1.179	20	15		16–24	Exp	Games	Cognition	Low
Study 2	Full sample	0.649	12	12		16–24	Exp	Games	Cognition	Low
Gunther et al. (2006)	Full sample	0.324			818	<16	Corr	General	Cognition (smoking)	High
Hines et al. (2000)	Full sample	0.193	71	80		<24	Exp	Movies	Cognition (smoking)	High
Krahé & Möller (2004)	Full sample	0.215			231	<16	Corr	Games	Cognition (c)	Low
Kulick & Rosenberg (2001)	Full sample	0.457	37	34		16–24	Exp	Movies	Cognition (alcohol) (c)	High
L′Engle et al. (2006)	Full sample	0.208			1,011	<16	Corr	General	Cognition (sex.)	Low
Lo & Wei (2005)	Full sample	0.606			2,001	<16	Corr	General	Cognition (sex.) (c)	High
McCool et al. (2005)	Full sample	0.249			3,042	<16	Corr	Movies	Cognition (smoking) (c)	Low
Pardun et al. (2005)	Full sample	0.201			1,074	<16	Corr	General	Cognition (sex.) (c)	High
Peter & Valkenburg (2009)	Full sample	0.723			2,343	16–24	Corr	General	Cognition (sex.)	High
Somers & Tynan (2006)	Female	0.000			253	16–24	Corr	Movies	Cognition (sex.)	High
	Male	0.000			196	16–24	Corr	Movies	Cognition (sex.)	High
Stacy et al. (2004)	Full sample	0.201			2,250	<16	Long	Movies	Cognition (alcohol) (c)	Low
Straub et al. (2003)	Full sample	0.150			512	<16	Corr	Ads	Cognition (smoking)	High
Supper (2010)	Female	0.959	22	20		16–24	Exp	Music	Cognition	Low
	Male	0.468	22	20		<24	Exp	Music	Cognition	Low
Temel (2010)	Female	0.471			184	<16	Corr	General	Cognition	Low
	Male	1.029			117	<16	Corr	General	Cognition	Low
Tripp (2010)	Female	0.581	21	22		<24	Exp	Games	Cognition	Low
	Male	0.234	20	19		<24	Exp	Games	Cognition	Low
Ward (2002)	Female	0.166			157	16–24	Corr	Movies	Cognition (sex) (c)	Low
	Male	0.347			88	16–24	Corr	Movies	Cognition (sex) (c)	Low
Weiss et al. (2006)	Full sample	0.468			1,544	<16	Long	General	Cognition (smoking)	High
Wills et al. (2008)	Full sample	0.387			4,932	<16	Long	Movies	Cognition (smoking)	Low
Wingood et al. (2001)	Female	0.215			367	16–24	Corr	Movies	Cognition (sex)	High

Note. A positive *g* (point estimate) indicates a positive relationship between risk-glorifying media exposure and risk-taking inclination. *N* = sample size; E = experimental condition; C = control condition; S = survey study; Exp = experimental design; Corr = correlational design; Long = longitudinal design; (c) = combination of two or more effect sizes.

Table 3
Effect Size Estimates of Risk-Promoting Emotions

Study	Sample	*g*	*N* E	*N* C	*N* S	Mean age (years)	Study design	Media type	Dependent variable	Fit: Stimulus response
Anderson & Dill (2000)	Full sample	0.305			226	16–24	Corr	Games	Emotions (c)	High
Ausweger (2010)	Female	0.477	26	26		16–24	Exp	Music	Arousal	Low
	Male	−0.119	28	25		16–24	Exp	Music	Arousal	Low
Banerjee et al. (2009)	Full sample	0.324			733	16–24	Corr	Movies	Arousal	Low
Fischer et al. (2009)										
Study 1	Full sample	0.644	18	16		<24	Exp	Games	Arousal (traffic)	High
Study 2	Full sample	0.943	16	15		16–24	Exp	Games	Arousal (traffic)	High
Study 3	Full sample	0.478	19	16		<24	Exp	Games	Arousal (traffic)	High
Study 4	Observers	0.634	16	15		<24	Exp	Games	Arousal (traffic) (c)	High
	Players	0.442	14	13		<24	Exp	Games	Arousal (traffic) (c)	High
Fischer et al. (2007; Study 2)	Female	0.381	17	19		16–24	Exp	Games	Arousal (traffic)	High
	Male	0.593	27	20		16–24	Exp	Games	Arousal (traffic)	High
Fischer et al. (2010; Study 2)	Full sample	1.548	12	12		16–24	Exp	Games	Arousal (c)	Low
Stoolmiller et al. (2010)	Full sample	0.683			6,522	<16	Long	Movies	Arousal	Low
Stulhofer et al. (2008)	Female	0.207			944	16–24	Corr	Movies	Arousal (sex)	High
	Male	0.305			584	16–24	Corr	Movies	Arousal (sex)	High

Note. A positive *g* (point estimate) indicates a positive relationship between risk-glorifying media exposure and risk-taking inclination. *N* = sample size; E = experimental condition; C = control condition; S = survey study; ex*p* = experimental design; corr = correlational design; long = longitudinal design; (c) = combination of two or more effect sizes.

0.47], $SE = 0.027$, $Z = 15.51$, $p < .001$), which represents a small to moderate effect size overall, according to the criteria set forth by Cohen (1988). The positive effect size indicates that exposure to risk-glorifying media content is associated with increased levels of risk taking. Further homogeneity analyses within the fixed effects model (cf. Hedges & Becker, 1986) revealed that the sample of effect sizes was significantly heterogeneous, $Q_T(104) = 980.00$, $p < .001$. Therefore, further moderator analyses were required.

Moderator analyses for overall risk taking (main analyses). For an overview of the results of all the moderator analyses, see Table 5.

General study and participant attributes. No significant differences in effect size magnitude were observed between experimental ($g = .49$, $SE = .054$, $Z = 9.03$, $p < .001$, $N = 25$), correlational ($g = .40$, $SE = .011$, $Z = 36.37$, $p < .001$, $N = 52$), and longitudinal ($g = .42$, $SE = .011$, $Z = 36.53$, $p < .001$, $N = 28$) studies, Q_B (2) = 3.66, $p = .16$. Moreover, consistent with most theories on risk taking and age, participants younger than 16 ($g = .42$, $SE = .009$, $Z = 44.89$, $p < .001$, $N = 49$) or between 16 and 24 years old ($g = .39$, $SE = .015$, $Z = 26.59$, $p < .001$, $N = 43$) showed larger effects on risk taking than those older than 24 ($g = .27$, $SE = .06$, $Z = 4.48$, $p < .001$, $N = 13$), $Q_B(2) = 8.03$, $p = .018$.

Different types of risk-glorifying media formats. The moderator analysis revealed a significant effect of type of media, $Q_B(4) = 24.77$, $p < .001$, with the effect being largest for risk-glorifying video games ($g = .49$, $SE = .029$, $Z = 17.12$, $p < .001$, $N = 20$), advertisements ($g = .47$, $SE = .02$, $Z = 22.99$, $p < .001$, $N = 19$), and films and TV ($g = .39$, $SE = .01$, $Z = 37.30$, $p < .001$, $N = 40$), followed by general, nonspecified risk-glorifying media consumption ($g = .40$, $SE = .017$, $Z = 22.74$, $p < .001$, $N = 18$) and risk-glorifying music ($g = .29$, $SE = .053$, $Z = 5.43$, $p < .001$, $N = 8$).

Different types of risk-taking outcomes. The association between risk-glorifying media exposure and risk taking differed in strength for different types of risk-taking outcomes, $Q_B(4) = 81.21$, $p < .001$. The largest effects were observed for the general risk taking miscellaneous category (e.g., gambling and other mixed

Table 4
Summary of Mean Effect Sizes for Fixed-Effect Analyses and Trim-and-Fill Analyses

Type of risk-taking outcome measure	*k*	*g*	95% CI	Q_T
Overall risk-taking (main analyses)	105	0.41	[0.39, 0.42]	980.00***
Trim-and-fill analysis	3 studies imputed	0.41	[0.39, 0.42]	
Risk-taking behavior	81	0.41	[0.39, 0.42]	766.61***
Trim and fill analysis	4 studies imputed	0.39	[0.37, 0.41]	
Risk-positive cognitions	47	0.35	[0.32, 0.37]	282.81***
Trim-and-fill analysis	15 studies imputed	0.27	[0.25, 0.29]	
Risk-promoting emotions	15	0.56	[0.52, 0.60]	86.86***
Trim-and-fill analysis	No studies imputed	0.56	[0.52, 0.60]	

Note. Trim-and-fill analyses refer to the left of the mean. *k* = number of independent effect sizes; *g* = point estimate of effect size Hedges's *g*; *Q* = heterogeneity.
*** $p < .001$.

Table 5
Moderators of Overall Risk Taking

Variable	Between-groups Q	k	Hedges's g	Within-group Q
Type of media	24.77***			
Video games		20	.49	61.52***
Film/TV		40	.39	588.62***
Advertisement		19	.47	194.41***
Others/mixed		18	.40	102.94***
Music		8	.29	7.74
Risk-taking outcome	81.21***			
Alcohol		16	.45	145.41***
Smoking		27	.44	266.49***
Risky driving		15	.41	113.68***
Sex		22	.29	162.29***
Others		25	.47	210.93***
Stimulus–response fit	21.32***			
Low/moderate		46	.37	399.47***
High		59	.44	559.22***
Process of media consumption	14.69***			
Passive		83	.40	896.40***
Active		22	.51	68.92***
Study design	3.66			
Experimental		25	.49	42.47*
Correlational		52	.40	548.97***
Longitudinal		28	.42	384.90***
Age (in years)	8.03*			
<16		49	0.42	684.22***
16–24		43	0.39	270.08***
>24		13	0.27	17.67

Note. k = number of independent effect sizes; Q = heterogeneity.
* $p < .05$. *** $p < .001$.

forms of risk taking; $g = .47$, $SE = .017$, $Z = 27.67$, $p < .001$, $N = 25$) and alcohol consumption ($g = .45$, $SE = .02$, $Z = 22.09$, $p < .001$, $N = 16$), smoking ($g = .44$, $SE = .013$, $Z = 32.45$, $p < .001$, $N = 27$), followed by risk taking in road traffic ($g = .41$, $SE = .029$, $Z = 13.88$, $p < .001$, $N = 15$) and sexual risk taking ($g = .29$, $SE = .016$, $Z = 17.78$, $p < .001$, $N = 22$).

Active versus passive media consumption. We found additional support for substantial media differences in a significant moderator effect for active (i.e., active video game exposure included) versus passive media (i.e., passive video game exposure as well as nonvideo game media formats), Q_B (1) = 14.69, $p < .001$, indicating that active risk-glorifying media consumption ($g = .51$, $SE = .027$, $Z = 18.77$, $p < .001$, $N = 22$) was associated with larger risk-taking effects than passive exposure to risk-glorifying media content ($g = .40$, $SE = .008$, $Z = 48.96$, $p < .001$, $N = 83$).

Fit between type of media and type of risk-taking outcome. A high fit between type of risk-glorifying media and type of risk-taking outcome ($g = .44$, $SE = .011$, $Z = 41.14$, $p < .001$, $N = 59$) resulted in larger effect sizes than a low and moderate fit (combined) between media and outcome ($g = .37$, $SE = .011$, $Z = 32.61$, $p < .001$, $N = 45$), $Q_B(1) = 21.32$, $p < .001$.

Additional combined moderator analyses on type of media and type of risk-taking outcome. We conducted further separate analyses to check whether different types of risk-taking outcomes are differently affected by different types of media formats. First, we kept the single risk-taking outcomes constant and tested whether different media formats would be associated with the specific risk-taking outcome in different strength.[5] With regard to alcohol consumption, we found that film formats ($g = .47$, $N = 9$) and advertisements ($g = .43$, $N = 7$) led to comparable effect size magnitudes in risk taking, $Q_B < 1$. Smoking was more strongly related to advertising ($g = .54$, $N = 10$) than to film formats ($g = .44$, $N = 11$) or general, nonspecified risk-glorifying media consumption ($g = .34$, $N = 6$), Q_B (2) = 22.48, $p < .001$. Moreover, risk taking in road traffic situations had a stronger link to risk-glorifying video game stimuli ($g = .66$, $N = 12$) than to film stimuli ($g = .13$, $N = 3$), $Q_B(1) = 79.35$, $p < .001$. Finally, sexual risk taking showed a stronger connection to general, unspecified risk-glorifying media consumption ($g = .44$, $N = 7$) than to films ($g = .14$, $N = 14$), $Q_B(1) = 77.92$, $p < .001$.

In the following analyses, we kept the different types of media constant and tested whether different risk-taking outcomes would be associated with different media formats in different strengths. Risk-glorifying films had strongest effects on general risk taking ($g = .54$, $N = 3$), alcohol consumption ($g = .47$, $N = 9$), and smoking ($g = .44$, $N = 11$), followed by sexual behavior ($g = .14$, $N = 14$) and risk taking in road traffic ($g = .13$, $N = 3$), Q_B (4) = 212.55, $p < .001$. Risk-glorifying advertisements had a stronger effect on smoking ($g = .54$, $N = 10$) than on drinking ($g = .43$, $N = 7$), $Q_B(1) = 5.89$, $p = .015$. Furthermore, risk-glorifying video games had stronger effects on risk taking in road traffic ($g = .66$, $N = 12$) than general (mixed) types of risk-taking inclinations ($g = .33$, $N = 8$), $Q_B(1) = 32.70$, $p < .001$.

Meta-Analysis 2: Mean Effect Sizes for Risk-Taking Behavior

The weighted mean effect size (point estimate) over 81 independent effect sizes was .41 for the fixed effects model (95% CIs [0.39, 0.43], $SE = 0.009$, Z = 45.81, $p < .001$) and .42 for the random effects model (95% CIs [0.36, 0.48], $SE = 0.03$, Z = 13.85, $p < .001$), which represents a small to moderate effect size overall, according to the criteria set forth by Cohen (1988). The sample of effect sizes was significantly heterogeneous, $Q_T(80) = 766.61$, $p < .001$. Thus, further moderator analyses were required.

Moderator analyses for risk-taking behavior. For an overview of the results of all the moderator analyses, see Table 6.

General study and participant attributes. No substantial differences in effect size magnitude were observed between experimental studies ($g = .42$, $SE = .081$, $Z = 5.10$, $p < .001$, $N = 14$) and correlational studies ($g = .45$, $SE = .013$, $Z = 35.78$, $p < .001$, $N = 41$), whereas both types of studies produced somewhat larger effects than longitudinal studies ($g = .37$, $SE = .013$, $Z = 28.52$, $p < .001$, $N = 26$), $Q_B(2) = 21.09$, $p < .001$. Samples of participants younger than 16 ($g = .41$, $SE = .011$, $Z = 38.65$, $p < .001$, $N = 43$) and between 16 and 24 years old ($g = .41$, $SE = .017$, $Z = 24.40$, $p < .001$, $N = 26$) showed a marginal larger risk-taking media effect than participants older than 24 ($g = .25$, $SE = .065$, $Z = 3.91$, $p < .001$, $N = 12$), $Q_B(2) = 5.90$, $p = .052$.

Different types of risk-glorifying media formats. The omnibus test revealed a significant effect for type of media, $Q_B(4) = 33.72$, $p < .001$, with the effect being largest for risk-glorifying

[5] We only report comparisons with $N > 2$ in the single conditions.

Table 6
Moderators of Risk-Taking Behavior

Variable	Between-groups *Q*	*k*	Hedges's *g*	Within-group *Q*
Type of media	33.72***			
Video games		14	.50	62.49***
Film/TV		28	.38	399.91***
Advertisement		16	.48	140.48***
Others/mixed		17	.38	123.44***
Music		6	.28	6.58
Risk-taking outcome	157.95***			
Alcohol		13	.45	144.81***
Smoking		22	.50	217.15***
Risky driving		11	.66	28.43**
Sex		18	.27	155.33***
Others		17	.31	62.95***
Stimulus–response fit	36.89***			
Low/moderate		34	.34	208.74***
High		47	.45	520.97***
Process of media consumption	19.51***			
Passive		65	.39	675.25***
Active		16	.53	71.85***
Study design	21.09***			
Experimental		14	.42	36.27**
Correlational		41	.45	436.48***
Longitudinal		26	.37	272.77***
Age	5.90†			
<16		43	.41	580.60***
16–24		26	.41	140.82***
>24		12	.25	30.18**

Note. *k* = number of independent effect sizes; *Q* = heterogeneity.
† $p < .10$. ** $p < .01$. *** $p < .001$.

video games ($g = .50$, $SE = .03$, $Z = 16.64$, $p < .001$, $N = 14$), advertisements ($g = .48$, $SE = .021$, $Z = 22.88$, $p < .001$, $N = 16$), and films and TV ($g = .38$, $SE = .013$, $Z = 29.07$, $p < .001$, $N = 28$), followed by general, nonspecified risk-glorifying media consumption ($g = .38$, $SE = .018$, $Z = 21.49$, $p < .001$, $N = 17$) and risk-glorifying music ($g = .28$, $SE = .055$, $Z = 5.06$, $p < .001$, $N = 6$).

Different types of risk-taking outcomes. Risk-glorifying media exposure differently affected the magnitude of behavioral risk-taking outcomes, $Q_B(4) = 157.95$, $p < .001$. The largest behavioral effects were observed for risk taking in road traffic ($g = .66$, $SE = .041$, $Z = 16.14$, $p < .001$, $N = 11$), smoking behavior ($g = .50$, $SE = .015$, $Z = 33.12$, $p < .001$, $N = 22$), and alcohol consumption ($g = .45$, $SE = .021$, $Z = 21.70$, $p < .001$, $N = 13$), followed by general (mixed miscellaneous category) types of risk-taking behavior ($g = .31$, $SE = .023$, $Z = 13.34$, $p < .001$, $N = 17$) and sexual risk taking ($g = .27$, $SE = .017$, $Z = 15.84$, $p < .001$, $N = 18$).

Active versus passive media exposure. Active exposure to risk-glorifying media formats ($g = .53$, $SE = .028$, $Z = 18.64$, $p < .001$, $N = 16$) had a larger effect on risk-taking behavior than did passive exposure ($g = .39$, $SE = .009$, $Z = 42.08$, $p < .001$, $N = 65$), $Q_B(1) = 19.51$, $p < .001$.

Fit between type of media and type of risk-taking outcome. A high fit between type of risk-glorifying media and type of risk-taking outcome ($g = .45$, $SE = .011$, $Z = 39.82$, $p < .001$, $N = 47$) resulted in larger effect sizes than a low and moderate (combined) fit between type of media and type of outcome ($g = .34$, $SE = .014$, $Z = 23.46$, $p < .001$, $N = 34$), $Q_B(1) = 36.89$, $p < .001$.

Meta-Analysis 3: Mean Effect Sizes for Risk-Positive Cognitions and Attitudes

The weighted mean effect size (point estimate) over 47 independent samples was .35 for the fixed effects model (95% CIs [0.32, 0.37], $SE = 0.013$, Z = 27.34, $p < .001$), and .41 for the random effects model (95% CIs [0.33, 0.49], $SE = 0.04$, Z = 10.26, $p < .001$), which represents a small to moderate effect size overall, according to the criteria set forth by Cohen (1988). The sample of effect sizes was significantly heterogeneous, $Q_T(46) = 282.81$, $p < .001$.

Moderator analyses for risk-positive cognitions and attitudes. For an overview of the results of all the moderator analyses, see Table 7.

General study and participant attributes. Experimental studies ($g = .52$, $SE = .059$, $Z = 8.78$, $p < .001$, $N = 21$) yielded larger effects than correlational ($g = .35$, $SE = .017$, $Z = 21.07$, $p < .001$, $N = 22$) and longitudinal ($g = .33$, $SE = .021$, $Z = 15.36$, $p < .001$, $N = 4$) studies, $Q_B(2) = 9.66$, $p = .008$. Samples of participants younger than 16 ($g = .33$, $SE = .015$, $Z = 21.84$, $p < .001$, $N = 14$) and between 16 and 24 years old ($g = .40$, $SE =$

Table 7
Moderators of Risk-Positive Cognitions

Variable	Between-groups *Q*	*k*	Hedges's *g*	Within-group *Q*
Type of media	72.25***			
Video games		17	.50	20.47
Film/TV		14	.26	51.92***
Advertisement		4	.31	47.18***
Others/mixed		8	.49	88.39***
Music		4	.60	2.61
Risk-taking outcome	56.83***			
Alcohol		5	.26	9.56*
Smoking		7	.33	15.81*
Risky driving		12	.19	34.96***
Sex		9	.45	111.48***
Others		14	.57	54.18***
Stimulus–response fit	40.39***			
Low/moderate		20	.28	71.07***
High		27	.44	171.36***
Process of media consumption	11.56**			
Passive		29	.34	244.82***
Active		18	.53	26.44†
Study design	9.66**			
Experimental		21	0.52	17.58
Correlational		22	0.35	240.41***
Longitudinal		4	0.33	15.16**
Age (in years)	7.94*			
<16		14	0.33	80.70***
16–24		24	0.40	184.48***
>24		9	0.48	9.69

Note. *k* = number of independent effect sizes; *Q* = heterogeneity.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

.025, $Z = 15.71$, $p < .001$, $N = 24$) showed a less pronounced risk-taking media effect on an attitudinal level than participants older than 24 ($g = .48$, $SE = .086$, $Z = 5.59$, $p < .001$, $N = 9$), Q_B (2) = 7.94, $p = .019$. However, this result is to be interpreted with caveats due to the rather low sample size of nine participants who were older than 24 years.

Different types of risk-glorifying media formats. The omnibus test revealed a significant effect for type of media, $Q_B(4) = 72.25$, $p < .001$, on the effect size magnitude of risk-positive cognitions, with the effect being largest for risk-glorifying music ($g = .60$, $SE = .147$, $Z = 4.05$, $p < .001$, $N = 4$) and video games ($g = .50$, $SE = .062$, $Z = 8.15$, $p < .001$, $N = 17$), followed by general, nonspecified risk-glorifying media ($g = .49$, $SE = .023$, $Z = 21.04$, $p < .001$, $N = 8$), advertisements ($g = .31$, $SE = .041$, $Z = 7.47$, $p < .001$, $N = 4$), and film and TV ($g = .26$, $SE = .017$, $Z = 15.43$, $p < .001$, $N = 14$).

Different types of risk-taking outcomes. Risk-glorifying media exposure differently affected the magnitude of risk-positive cognitions in different outcome domains, $Q_B(4) = 56.83$, $p < .001$. The largest cognitive effects were observed for cognitions generally (and implicitly) related to risk taking ($g = .57$, $SE = .061$, $Z = 9.47$, $p < .001$, $N = 14$), followed by risk-taking cognitions pertaining to sex ($g = .45$, $SE = .024$, $Z = 18.87$, $p < .001$, $N = 9$) and smoking ($g = .33$, $SE = .02$, $Z = 16.15$, $p < .001$, $N = 7$) and by cognitions positively related to alcohol consumption ($g = .26$, $SE = .031$, $Z = 8.55$, $p < .001$, $N = 5$) and risk taking in road traffic ($g = .19$, $SE = .039$, $Z = 4.91$, $p < .001$, $N = 12$).

Active versus passive media exposure. As for overall risk-taking inclinations and risk-taking behavior, active consumption of risk-glorifying media formats ($g = .53$, $SE = .056$, $Z = 9.55$, $p < .001$, $N = 18$) led to larger effects on risk-positive cognitions than passive media consumption ($g = .34$, $SE = .013$, $Z = 25.84$, $p < .001$, $N = 29$), $Q_B(1) = 11.56$, $p = .001$.

Fit between type of media and type of cognitive risk-taking domain. A high fit between the type of risk-glorifying media and type of cognitive risk-taking domain ($g = .44$, $SE = .02$, $Z = 22.59$, $p < .001$, $N = 27$) resulted in larger effect sizes of risk-taking cognitions than did a low fit ($g = .28$, $SE = .017$, $Z = 16.65$ $p < .001$, $N = 20$), $Q_B(1) = 40.39$, $p < .001$.

Meta-Analysis 4: Mean Effect Sizes for Risk-Positive Emotions and Arousal

The weighted mean effect size (point estimate) over 15 independent samples was .56 for the fixed effects model (95% CIs [0.52, 0.60], $SE = 0.021$, Z = 26.03, $p < .001$), and .45 for the random effects model (95% CIs [0.27, 0.62], $SE = 0.089$, Z = 5.03, $p < .001$), which represents a small effect size overall, according to the criteria set forth by Cohen (1988). The sample of effect sizes was significantly heterogeneous, $Q_T(14) = 86.86$, $p < .001$. However, due to the relatively low number of studies on risk-positive emotions, we did not conduct further moderator analyses.

Control for Publication Bias

We controlled for publication bias (the "wastebasket effect") in several ways. First of all, a classic fail-safe *N* test for the overall risk-taking outcome (cognitions, emotions, and behaviors combined) revealed that it would take 8,228 missing studies with null effects to annul the overall effect observed in the present meta-analyses on a $p = .001$ level. Inasmuch as the fail-safe *N* test has been increasingly criticized for not being particularly expressive or valid (Evans, 1996), we conducted further sensitivity analyses. Second, we tried to include as many unpublished effect sizes as possible ($N = 25$ single-coded effect sizes). Third, inspection of the funnel plot did not reveal any major asymmetries, which would be the case if publication bias were present (see Figure 1). Fourth, we also checked for publication bias using a trim-and-fill analysis (a widely used form of sensitivity check in meta-analyses; Duval, 2005; Duval & Tweedie, 2000). The trim-and-fill method allows researchers to see how much the estimated effect size changes when publication bias is statistically controlled. Due to the rather

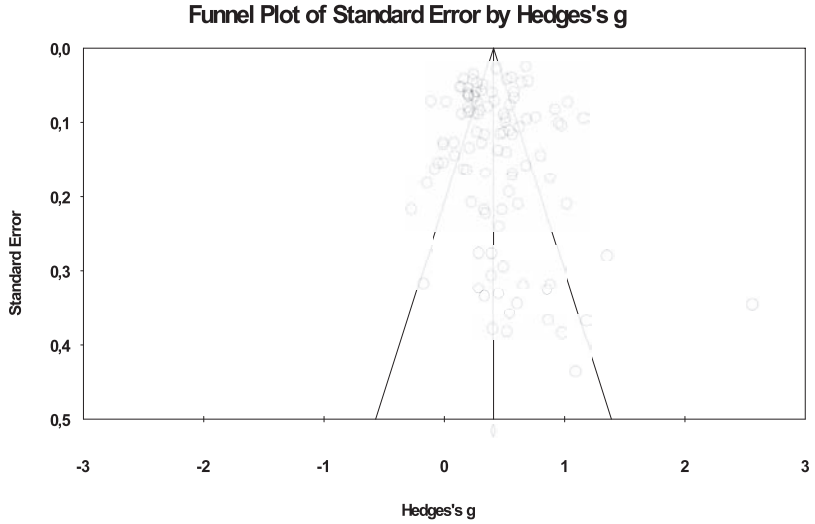

Figure 1. Funnel plot for overall risk taking (main analyses with cognitions, emotions, and behaviors combined).

symmetric distribution of effect sizes for overall risk taking, this analysis revealed that no studies had to be imputed on the right side of the funnel plot. On the left side, only three studies had to be imputed, which actually led to no reduction in effect size magnitude (original $g = .408$; adjusted $g = .406$; see Table 4). Thus, publication bias is unlikely to distort the findings of the present meta-analysis in any substantial way.

Control for Potential Confounders

Adjusted versus unadjusted effect sizes. In general, it is common for authors of meta-analyses to employ unadjusted effect sizes (i.e., effect sizes where the researchers did not additionally control for different sociodemographic variables such as age, income, or gender; Anderson et al., 2010). In many of the studies we examined, the researchers did not report adjusted effect sizes (e.g., Banerjee, Greene, Krcmar, & Bagdasarov, 2009). However, we also inspected a sample of studies in which adjusted effect sizes were reported, and we compared them to the effect size magnitudes of the meta-analysis. For example, Biener and Siegel (2010) adjusted for several variables that were related to the pre-existing risk taking (i.e., smoking) of family members, friends, and the focal participant, as well as for personality traits. The authors still found a substantial connection between exposure to risk-glorifying media content and risk taking ($g = .39$), which is comparable in magnitude to the mean overall effect size of the present meta-analysis ($g = .43$). Other researchers such as Distefan, Pierce, and Gilpin (2004); Choi et al. (2002); and Primack, Gold, Land, and Fine (2006) also reported adjusted effects, which ranged from between $g = .29$ and $g = .31$ and are thus in the same effect size range as the overall, unadjusted effect size found in our meta-analysis. In addition, the present research contains many experiments ($N = 25$; accounting for 23.81% of all effect sizes) in which a priori differences were naturally controlled by randomization. The effect sizes in experiments were even slightly larger than those of correlational studies; this finding adds further support to the assumption that risk-glorifying media content has a substantial causal impact on risk-taking behaviors, cognitions, and emotions. In sum, the inspection and comparison of adjusted versus unadjusted effect size magnitudes reveal that the risk-taking media effect is a substantial one, with a small to moderate effect size.

Interplay between moderators (combined moderator analyses). As noted previously, we had a priori predictions for the moderator variables "active versus passive media exposure" (stronger effects for active exposure than for passive exposure) and "fit between type of media and type of risk-taking outcome" (stronger effects for high fit than for low fit). To test the possibility that these moderating effects are driven by confounding variables, we compared the moderator effects for all levels of the other moderating variables. For example, we compared the effect of active versus passive exposure on risk-taking outcome separately for all age groups. For the "active versus passive" moderator, 12 comparisons (two for type of media, three for outcomes, two for fit, three for age, and two for study design) could be made. For the "fit" moderator, 17 comparisons (five for type of media, five for outcomes, two for active versus passive, three for age, and two for study design) could be made. No comparison could be made, for instance, between active and passive exposure for longitudinal studies because passive exposure was used in all longitudinal studies (and thus there were no effects for longitudinal studies with active exposure). The effects were stronger for active than for passive exposure in 9 cases (type of media: video games, others; outcome: others; fit: low fit; age: older, middle, young; study design: experimental, correlational), whereas the effect for passive media exposure was stronger than that for active exposure in two cases (for the outcome variable driving and for high fit). The effects were stronger for high fit than for low fit in 11 cases (type of media: film, advertisement, others; outcome: alcohol, smoking, sex, others; active vs. passive: passive age: older, young; study design: correlational), whereas the effects were stronger for low fit than for high fit in six cases (type of media: video games, music; outcome: driving; active vs. passive: active age: middle; study design: experimental). In sum, there is strong evidence that the finding that active (relative to passive) exposure is more strongly associated with risk-taking outcomes is not influenced by the other moderating variables. The finding that high (relative to low) fit is more strongly associated with risk-taking outcomes is also relatively unaffected by the other moderating variables.

General Discussion

In the present meta-analysis, we investigated whether a reliable association exists between exposure to risk-glorifying media content and risk-taking inclinations. For all of the investigated risk-taking measures (overall combined risk-taking inclination, risky behavior, risk-positive cognitions, and risk-positive emotions), a positive connection was found. Across differing research methodologies (correlational, longitudinal, experimental), varying media formats (video games, movies, advertising, TV), and different forms of risk-related outcome measures (smoking, drinking, risky driving, sexual behavior), a consistent positive association was observed between exposure to risk-glorifying media content and subsequent risk-taking inclinations and behaviors. For the four investigated dimensions, overall combined risk taking ($g = .41$), risk-taking behaviors ($g = .41$), risk-positive cognitions and attitudes ($g = .35$), and risk-positive emotions and arousal ($g = .56$), the effects were substantial in a small to moderate range. The fact that the effect could be found in similar strength in both experimental and correlational studies speaks to both its internal and external validity.

Additional moderator analyses for overall risk taking (combined risky behavior, risk-positive cognitions and attitudes, risk-positive emotions and arousal) revealed that the effect was largest for (a) active video game exposure (vs. passive exposure to risk-glorifying films, music, advertisements, and so forth); (b) general and health-related risk taking; and (c) a high (compared with low) contextual fit between media content and type of risk-taking measure. Similar patterns were also found for the subdimensions of risky behavior and risk-positive cognitions and attitudes. Overall, these findings have important theoretical implications, which we discuss in the next section.

Theoretical Implications

Overall, these results support recent lines of research into the relationship between risk taking and the media. The present synthesis shows that there is indeed a reliable connection between exposure to risk-glorifying media content and risk-taking behaviors, cognitions, and emotions. This effect could be shown across

different types of research methods, kinds of media stimuli, and types of risk-related outcome measures. The converging evidence from both correlational studies with high ecological validity and experimental studies with high internal validity suggests that the phenomenon under investigation is a robust one, with considerable theoretical and practical implications. Most important, the inclusion of experimental and longitudinal studies in addition to correlational work in which potential confounders (such as gender, age, and prior exposure to risk-glorifying media) were partially controlled makes us confident that there is indeed a causal relationship between risk-glorifying media exposure and subsequent risk-taking inclinations and behaviors.

Expanding on the latter point, we believe that the present meta-analysis informs the debate regarding whether risk-taking media effects are based spuriously on selective exposure and self-selection effects. First of all, we found comparable effect sizes for correlational, experimental, and longitudinal studies, which make us confident that there are—both from a short- and long-term perspective—causal effects of risk-glorifying media on risk-taking cognitions, emotions, and behaviors. Second, we additionally inspected correlational studies in which potential confounders such as trait risk-positive inclinations, family attributes, and peer behaviors were controlled directly. These studies revealed comparable effect size magnitudes for the risk-taking media effect. Thus, on the basis of the present meta-analysis, we can conclude that risk glorification in media formats does causally increase risk-taking inclinations and behaviors in the real world.

The findings of the present meta-analysis also have important theoretical implications for sociocognitive models in media research. First, these findings inform the debate as to whether media exposure affects behavior at all (see Anderson et al., 2010; Ferguson & Kilburn, 2010, for the debate on the effects of violent video games on aggressive behavior). In line with Anderson et al.'s (2010) findings in the domain of violent media, we found substantial causal effects of risk-glorifying media exposure on actual and self-reported behavior. Thus, we must state that media exposure affects behavior. Moreover, the present meta-analysis revealed that sociocognitive models such as the GAM and the GLM are powerful frameworks that provide explanations of the effects of risk-glorification in the media on risk taking. Therefore, from a theoretical perspective, the present findings should be interpreted from the angle of other, more established media research. Media exposure has been found to affect its recipients' thoughts, feelings, and behaviors in a variety of areas, including shifts in political viewpoints (Iyengar & Kinder, 1987; Krosnick & Kinder, 1990; Pan & Kosicki, 2001), stereotype formation (Hansen & Hansen, 1988; Hansen & Krygowski, 1994), and elicitation of aggressive responses (e.g., Bushman, 1998). In particular, a large body of evidence shows that violent media is linked to aggressive responses on cognitive, emotional, and behavioral dimensions (e.g., Anderson et al., 2010; Berkowitz, 1984). These effects have been found for varying types of media format, such as violent movies (Anderson, 1997; Anderson, Anderson, & Deuser, 1996; Bushman & Geen, 1990), video games (Anderson & Dill, 2000; Anderson et al., 2010; Fischer, Kastenmüller, et al., 2010), and song lyrics (Anderson, Carnagey, & Eubanks, 2003; Fischer & Greitemeyer, 2006). The findings of the present meta-analysis qualify the effects of risk-glorifying media as another important impact that media exposure can have upon its recipients' attitudes, cognitions, emotions, and behaviors.

In addition, the present meta-analysis increases the specificity of sociocognitive models in explaining media effects. In its current incarnation, the GAM and the GLM convey the idea that (a) media exposure has an impact on cognitions, emotions, and behaviors and (b) there are reasons that media exposure has this impact (i.e., psychological processes of priming and learning). However, a shortcoming of these models is that they make no specific assumptions about boundary conditions under which this impact is especially pronounced. The present meta-analysis adds further boundary conditions to the GAM and the GLM in showing that (a) different types of media formats have different effects on different types of risk-taking outcome variables; (b) active media exposure via video games has a stronger effect than passive exposure (e.g., via films, music, and advertising); and (c) the effect is stronger when there is a direct contextual relationship between risk-taking media content and risk-taking outcome (e.g., depictions of reckless driving and actual risky driving) than when there is a low contextual fit (e.g., alcohol advertising exposure and actual risky driving). The latter finding is theoretically important since it shows that specific risk-glorifying media stimuli work like heuristic cues that even carry over to completely unrelated risk-taking outcome domains.

In our view, the finding with the most important theoretical implications is that the effects for risk-promoting cognitions were stronger for active (video games) than passive types of media consumption (film, music, and so forth). This supports the findings of Fischer et al. (2009), who showed that the players of risk-glorifying video racing games subsequently indicated a greater willingness to take risks than participants who had only observed another person playing said games. The authors argued that playing video games is more involving (and thus more relevant to an individual's self-concept) than the passive consumption of risk-glorifying media content. This argument is also supported by the present analysis. Therefore, sociocognitive theories should be extended by incorporation of a variable that reflects the way in which specific media content is consumed (actively vs. passively). In sum, we think it is fair to conclude that the GAM and the GLM provide a useful framework for investigation of the effects of media exposure in action. However, the boundary conditions under which media exposure effects are more or less pronounced in these models should be examined.

Limitations and Directions for Future Research

The present meta-analysis did not include studies in which neuropsychological methods were used. In the future, a fruitful endeavor for researchers would be to investigate the neuronal correlates of exposure to risk-glorifying media content in order to further clarify the underlying psychological processes. For example, we would expect that brain circuitry associated with the processing of rewards (i.e., orbitofrontal cortex and striatum) would be particularly involved in the connection between exposure to risk-glorifying media stimuli and subsequent real-world risk

taking.[6] Moreover, we mainly explained the present findings by sociocognitive models such as the GAM and the GLM. However, especially for risk-glorifying media formats in advertising (e.g., alcohol glorification in TV ads), research also should be conducted on persuasion processes in this area as potential underlying psychological mechanisms (cf. Cialdini, 2001).

With regard to participant age, we found in the overall analyses that the effects of risk-glorifying media content on risk taking were stronger for individuals who were either younger than 16 years old or between 16 and 24 years old than for individuals who were older (> 24 years). This is consistent with the literature on risk taking, which posits that young men are particularly prone to risk taking as a way of demonstrating genetic fitness to potential female mating partners (Byrnes et al., 1999).

Note that we were not always successful in our attempts to disentangle the specific consumption of risk-glorifying media from general media consumption that happens to include risk-glorifying content, and this is a problem that occurs in most meta-analyses that incorporate correlational data. Predictor variables are not always measured (or able to be measured) in their purest form. However, we coded whether the authors employed a global measure of media consumption (including risk-taking media) or a more specific one. The global measure produced slightly less pronounced effect sizes, but at the end of the day, they remained comparable with the specific media exposure measures. Thus, we conclude that this circumstance is no threat to the validity of our conclusions. Nevertheless, in the future, researchers in correlational media should try to measure specific types of media exposure as concretely and distinctly as possible.

In addition, it is important to note that our finding that active media exposure is associated with stronger effects on risk taking than passive exposure partially depends on the point of view one takes. Especially from a public health perspective, it is—at least currently—unlikely that long-term exposure to positively portrayed drug use in movies might have weaker effects on drug abuse than exposure to drug-glorifying video games. Reasons for that might be that drug abuse is shown more frequently in films than in video games; and people generally spend more time watching films than playing video games. However, this might change in the future since video game consumption is on the rise (Gentile, Lynch, Linder, & Walsh, 2004), and the technique of video games progresses quickly (e.g., virtual reality). Finally, from a related public health perspective, it would be also interesting for future researchers to compare effects of risk-positive vs. risk-negative media depictions on risk taking.

Another limitation of the present analysis is that we could not take into account different levels of prevalence for specific risk-taking behaviors. For example, much more Americans drink alcohol than smoke cigarettes. So, positive depictions of alcohol consumption should have much stronger effects than positive depictions of smoking (since we know that media depictions of substance abuse have stronger effects on recipients who already show this behavior). In addition, for some risk-taking domains, much more studies are available than for other domains. For example, there are rather few experimental studies on sex in the media, but there are many elaborated studies on smoking or drinking in the media. In future research, these variables should be taken into account as potential confoundings of the risk-glorifying media effect.

Finally, we need to discuss the finding that health-related risk taking was among the strongest effects of all outcome variables, whereas video games (studies in which mainly—but not exclusively—risky driving was used as the outcome variable) showed strongest effects of all risk-glorifying media stimuli. Although at first it appears that these two findings do not fit together, there is a simple explanation. Separate combined moderator analyses for overall risk-taking inclinations (Meta-Analysis 1) revealed that there were three independent samples on the impact of risk-glorifying film stimuli on risky driving, which show rather low (but still reliable) effect sizes (g = .13), whereas risk-glorifying video game stimuli had rather strong effects on risky driving (g = .66). This explains how video games can have the strongest impact overall, and at the same time, however, risky driving shows lower overall effect sizes than health-related risk taking (alcohol, smoking).

Practical, Societal, and Political Implications

The results of the present meta-analysis have important societal and political implications. Similar to public concerns about restricting access to violent media (especially aggressive, first-person-shooter video games), the most important question is whether authorities should be more proactive in limiting the availability of risk-glorifying media formats to children and adolescents. The United States and Europe have already begun to ban tobacco and alcohol advertising in the media (with the European Union's 2005 anti-tobacco-advertising measure being credited with causing a significant year-to-year decline in the number of young adolescents smoking), which, given the results of the present meta-analysis, may be important in reducing health-related risk taking.

Besides banning the advertisement of positive depictions of health-related risk taking (alcohol, tobacco, risky sex), authorities should also work to reduce positive images of risk taking in road traffic in car advertising. This is mainly because illegal street-racing has become a huge problem for road traffic authorities. For example, over 2,000 annual, illegal episodes of street-racing have been observed by police departments in California alone (cited from Fischer et al., 2009), and nationwide U.S. studies report significant increases in fatal street racing crashes over the last few years (Knight, Cook, & Olson, 2004). Researchers mainly attribute this increase to the promotion of a risk-glorifying street racing culture in the media and car advertising (Vingilis & Smart, 2009), which is even communicated to young children (such as in the cartoon *Speed Racer*) and has led to copycat stunts. Initial steps to reduce this kind of risk-glorification in the media have already been implemented. For example, a video game that simulated illegal street racing through a realistically rendered version of the city of Sydney was banned by Australian road safety authorities (cited in Vingilis & Smart, 2009; see also Fischer, Vingilis, Greitemeyer, & Vogrincic, in press) after being advertised with the slogan, "Burn up a storm past famous landmarks such as the Opera House and Sydney Harbour."

Based on the present analysis, important practical implications for how risk-taking behavior can be decreased may be recom-

[6] We thank Aureliu Lavic for this important point.

mended. Similar to investigations into the effects of media exposure on pro- and antisocial behavior (where it has been shown that antisocial media exposure increases aggression and decreases prosocial outcomes; Anderson et al., 2010; whereas prosocial media exposure decreases aggression and increases prosocial outcomes; e.g., Greitemeyer & Osswald, 2009, 2010), it might be found that despite risk-glorifying media's ability to increase risk taking, it can also convince people to reduce risks by portraying their potential dangers (see also Pechmann, 2001). For instance, watching a film in which car racing leads to death rather than admiration (such as *Rebel Without A Cause*) might foster more cautious driving behavior.

Conclusion

The present meta-analysis has shown that risk-glorification in the media is substantially associated with increases in real-life risk-taking behaviors, risk-positive cognitions and attitudes, and risk-promoting emotions. This connection has been found causally in a variety of experiments, as well as in a correlative and longitudinal fashion. Thus, it appears that risk-glorifying media has potentially grave consequences, such as innumerable incidences of fatalities, injuries and high economic costs in a broad variety of risk-taking domains such as substance abuse, reckless driving, gambling, and risky sexual behavior. We hope that the present meta-analysis contributes to increased awareness of the danger of risk-glorifying media content for both individuals and society.

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