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The Effect of Active and Passive Peer Discouragement on Adolescent Risk taking: An Experimental Study

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This experiment investigated the effect of peer discouragement on adolescent risk taking. Overall, 269 Dutch adolescents aged 11–15 years completed a risk taking computer task in the presence of an e-confederate who demonstrated very little risk taking (passive peer discouragement) and/or sent risk-discouraging messages to participants (active peer discouragement). The results showed that, compared to a situation with no peer discouragement, adolescents took significantly less risk only when they encountered a combination of active and passive peer discouragement; hence, when peers practiced what they preached. No gender differences were found in the effect of passive and active peer discouragement on risk taking. The results showed that digital peer messages play a promising role in diminishing adolescent risk taking.

Adolescence is a period with heightened potential for risky decision making and general risk taking (Albert & Steinberg, 2011), which may lead to engagement in risk behaviors later in life, such as using illegal or potentially dangerous drugs, having unsafe sex, and engaging in minor criminal activity (Arnett, 1992). Peers influence adolescents' engagement in risk taking. Adolescents have increased unsupervised contact with peers and they begin to place greater importance on their peers' approval, views, and advice, relying on peer feedback for self-evaluation (Brown, 1990; Crone & Dahl, 2012; Hergovich, Sirsch, & Felinger, 2002). Therefore, in early and middle adolescence, youth are most susceptible to peer influence, and they feel compelled to conform to the perceived expectations of others (Steinberg, 2007). The existing studies have focused mainly on the ways in which peers contribute to the increase in adolescent risk taking, yet little is known about whether peers may also decrease adolescent risk taking. Overall, peers seem to discourage rather than encourage adolescents from engaging in risk taking (Urberg, Shyu, & Liang, 1990). Hence, it is important to gain more insight into the influence of peer discouragement on risk taking. To achieve this, two types of peer influence, passive (modeling) and active (pressure), need to be distinguished. The current study examined the effect of active and/or passive peer discouragement on risk taking in one experimental design. In addition, we investigated whether the effect of peer discouragement on risk taking was stronger for some adolescents compared to others by examining gender as a moderator. Intervention programs are often based on the assumption that peers contribute to an increase rather than a decrease of adolescent risk-taking behaviors. It is important to know whether this decrease is a result of peer pressure or imitation. Furthermore, it is important to know whether intervention programs should be more gender-specific.

Passive and Active Peer Discouragement of Risk taking

Several theories (e.g., peer contagion theory, primary socialization theory, social identity theory, and social network theory) explain the ways in which peers can influence adolescent risk taking (Abrahams & Hogg, 1990; Dishion & Tipsord, 2011; Leinhardt, 1977; Oetting & Donnermeyer, 1998). These theories propose that peers serve as significant reference points in adolescent risk taking (Kobus, 2003). Accordingly, they influence the decision making of adolescents, including risk taking. Peers have been operationalized in different ways, such as (best) friends, classmates, acquaintances, peer groups, group of closest friends, and even total strangers (Avenevoli & Merikangas, 2003). In everyday life, we are exposed to the behavior of different type of peers in different social contexts, such as the media, school, social events, and during leisure or sport activities, among others (Hara-

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keh, Engels, Van Baaren, & Scholte, 2007). In this study, we focus on peers defined as complete strangers to the adolescent. Social media plays a big role in the lives of adolescents. Since they are also able to meet peers who are strangers, it is important to investigate the influence of a digital unfamiliar peer on the decision making of adolescents, specifically risk taking.

Two types of peer influence, active and passive, have been proposed in the literature (Bandura, 1977), and they should be distinguished when examining risk taking. On the one hand, active peer influence is a more explicit form of peer influence that can involve peer pressure to engage in more risk taking (Harakeh & Vollebergh, 2011). On the other hand, passive peer influence is a more implicit form of peer influence in that adolescents intentionally (the social learning theory of Bandura, 1977) or unintentionally (the perception-behavior link of Chartrand & Bargh, 1999) imitate the risk taking of their peers. Passive and active peer discouragement should be investigated using an experimental design; survey studies might not be able to validly measure peer influence because imitation might happen unconsciously and therefore it might be difficult to measure using a questionnaire. The operationalization of peer pressure in questionnaires has received some criticism. Inconsistent findings have been obtained due to an inconsistency between adolescents' expectations and beliefs about peer pressure to take risk and adolescents' own subsequent personal experiences (Michell & West, 1996). An experimental design would provide a more objective way to measure peer pressure through observing actual behavior without eliciting socially desirable behavior or answers.

Peers might also influence adolescents to engage in less risk taking. A few experimental and intervention studies on risk taking provide empirical evidence that peer discouragement can be effective in reducing risk taking. A chat room experiment that examined peer influence on the willingness of middle adolescent boys to drink found that these adolescents adapted their willingness to drink based on the pro-alcohol as well as anti-alcohol norms of their peers ("grade-mates" who were actually e-confederates). Some adolescents even internalized their peers' anti-alcohol norms (Teunissen et al., 2012). Although this study showed that peer discouragement could be effective, it did not distinguish between active and passive attempts to change the participant's willingness to drink. However, it did show that these kinds of peer group norms, which tap into the passive influence of peers, have an effect on adolescent risk taking. Empirical evidence has also shown that passive peer discouragement can be effective in diminishing risk taking. An experimental study using the stoplight game task revealed that, when a model vehicle ran the yellow light, 65% of the young adults also ran the yellow light, even though they were 30 meters behind the model vehicle. Nonetheless, when the model vehicle stopped at the intersection, only 25% of the participants decided to pass (Duan, Li, & Salvendy, 2012). It is unknown whether the same results are generalizable to adolescents, especially early and middle adolescents, because adolescents are more susceptible to the influence of their peers compared to young adults (Steinberg & Monahan, 2007). Therefore, it is expected that if peer models give a good example and engage in less risk taking, adolescents might imitate these models.

Additionally, empirical evidence has shown that active peer discouragement can diminish risk taking. For example, the ASSIST intervention program, in which informal peer supporters (nominated influential classmates) diffused health promotion messages, appeared to be effective in reducing early adolescent smoking levels, even at a 1-year follow up (Audrey, Holliday, & Campbell, 2006). This ASSIST intervention study focused only on active peer influence (i.e., communicating the risks of smoking and the benefits of being smoke-free) and did not consider passive peer influence. Moreover, in an experimental–observational study in which late adolescents had to watch road-crossing videos in the presence of friends, cautious comments from their friends (i.e., active discouragement) positively influenced adolescents' decisions regarding road crossing (Pfeffer & Hunter, 2013). It must be noted that in these studies the peer was operationalized as someone the adolescent already knew. Thus, it is unknown whether active discouragement of an unfamiliar peer also diminishes or reduces adolescent risk taking.

Hence, unfortunately, active and passive peer influence have often been studied in relative isolation (Borsari & Carey, 2001), making the comparison of the relative importance of the underlying mechanisms impossible. The only study that examined both types of peer discouragement in one experimental design is that of Harakeh and Vollebergh (2011). The researchers focused on unfamiliar peers and found that imitation of nonsmoking peer models rather than peer pressure not to smoke seemed to be the underlying mechanism that could

deter young adults from smoking. It must be noted that only smoking behavior was examined. Peer influence mechanisms that are most likely to diminish general risk-taking behaviors are largely unknown. It is important to gain more insight into the process of peer influence and general risk taking in early and mid-adolescence to understand how to intervene at earlier ages. This might prevent problems associated with adolescents' engagement in risk behaviors, such as smoking and alcohol drinking, later in life.

For older age groups, there is support that both passive and active peer discouragement can be effective in diminishing risk taking (Duan et al., 2012; Harakeh & Vollebergh, 2011; Pfeffer & Hunter, 2013). It is expected that both mechanisms are also relevant for early and middle adolescents. In adolescence, youth is most susceptible to peer influence (Steinberg, 2007); therefore, the peer influences found for young adults might also be found for early to middle adolescents. It was expected that the combination of passive and active discouragement would have the greatest effect on decreasing risk taking, as adolescents might more easily give into the active demands of others when they perceive that those who are trying to discourage them from risk-taking behaviors also take less risk themselves.

Gender Differences in the Peer Influence Mechanisms

It is important to know whether intervention programs that focus on reducing risk taking in adolescence should be different for boys and girls. Knowledge regarding gender differences in the effectiveness of active and passive peer discouragement could help design interventions that would be more effective. Overall, boys are more susceptible to peer influence compared to girls, whereas girls show more resistance to peer influence compared to boys (Sumter, Bokhorst, Steinberg, & Westenberg, 2009). These gender differences are presumed to reflect social and gender norms, particularly at a time of vulnerable self-identity in adolescence (Bonomo et al., 2001). Compared to boys, girls characterize themselves as more likely to stand up for what they believe rather than to alter their behavior to conform to the expectations of their peers (Steinberg & Monahan, 2007).

Regarding the peer influence underlying risk encouragement, studies have shown that men give in to active peer pressure to engage in risk-taking behavior more than women do (Cullum, O'Grady, Armeli, & Tennen, 2012). Additionally, they report greater social pressure and experience greater embarrassment about not conforming compared to women due to the fear of not fitting in (Suls & Green, 2003). Whether the same is true for peer discouragement of risk taking among adolescents remains unknown. On the one hand, boys are more likely to adapt their behavior to risk-encouraging norms, suggesting that they will also adapt their behavior to risk-discouraging norms (that are passively modeled or actively communicated to them). On the other hand, taking risk might be associated with boys' reputation and social status (Hartup, 1996); therefore, boys might be less likely to adapt their risk taking compared to girls when their peers encourage them to take less risk. When gender differences were studied, no distinction was made between the effectiveness of passive and active peer influences. Additionally, most studies focused on the encouragement of risk taking when examining gender differences. Boys and girls might respond differently when they are encouraged to increase *negative behavior* (e.g., more risk taking) or decrease *negative behavior* (e.g., less risk taking), as the degree to which risk taking is part of the reputation differs by gender. Therefore, it is important to focus on gender differences in the effectiveness of risk discouragement.

The Current Study

The current study investigated the role of unfamiliar peers in discouraging risk taking among early and middle adolescents. The research questions that were central in this study inquired about (1) the effect of active and passive peer discouragement on risk taking and (2) gender differences regarding the relative effect of active and passive peer discouragement on risk taking. It was expected that active and passive peer discouragement as well as their combination would significantly decrease adolescent risk taking. Gender differences regarding the relative effect of active and passive peer discouragement were explored without specific expectations because, to our knowledge, previous studies have not addressed gender differences in the effect of passive and active peer discouragement on risk taking.

METHODS

Sample

Participants were 276 early and middle adolescents. Seven participants were removed from the

data set because they encountered a problem with the computer task ($N = 4$) or because they partly guessed the actual aim of the study ($N = 3$). Three participants thought that the goal of the study was to investigate the ways in which they would respond to the e-confederate or they assumed that the e-confederate was not a real peer but a programmed response. These participants therefore partly guessed the goal of the study, which could have influenced their risk taking. Therefore, we decided to exclude them from the study. Four participants encountered a problem with the computer task in that they did not fully understand how the computer task worked. The removal of seven participants resulted in 269 participants between the ages of 11 and 16 ($M = 13.10$, $SD = 0.96$) of which 144 were boys (53.5%) and 125 were girls (46.5%). Although only one participant was 16 years old, we still included this participant as he was in the same class as the other participants and hence would still be susceptible to the influence of his peers, irrespective of the 1-year age difference. Participants were recruited from the first (30.9%), second (46.5%), and third (22.7%) year of two secondary schools in the area of Eindhoven (the Netherlands). Participants were selected from higher general (17.8%), preuniversity (51.7%), and a combination class of higher general and preuniversity education (30.5%). Most participants (97.0%) were born in the Netherlands and 24.9% of the participants had at least one parent who was born in another country.

Design

Participants were administered a computer task and a questionnaire, which took approximately 20 min to complete. The computer task, the Balloon Analogue Risk Task (BART), measured risk taking by requiring participants to inflate a computer-generated balloon (Lejuez et al., 2007). By inflating the balloon, participants could earn points. The more pumps the participant gave the balloon, the more points he or she could earn. However, no points were earned when the balloon exploded. Participants had to inflate 30 balloons, which could explode at a random number of pumps (predetermined sequence). By means of a 2 (passive influence or not) × 2 (active influence or not) × 2 (boy or girl) between-subjects design, the current study investigated whether adolescents took less risk when they were actively (i.e., pressured) and/or passively (i.e., modeled) discouraged by a peer to take risk. This peer was a fictitious person who was created with a computer program (an e-confederate). The design of this study was based on that of MacLean, Geier, Henry, and Wilson (2014).

The participants were randomly divided into four conditions, namely the control condition ($N = 68$), the passive peer discouragement condition ($N = 69$), the active peer discouragement condition ($N = 66$), and the combined peer discouragement condition ($N = 66$). Each condition comprised an approximately even number of boys and girls. The BART was modified by including risk-discouraging information. In the control condition, the e-confederate was not manipulated, and participants completed the normal BART. In the passive condition, the average number of pumps of the e-confederate was shown to the participants to investigate the effects of modeling (peer imitation). In the active condition, the e-confederate sent messages to participants, advising them to take less risk (peer pressure). Lastly, in the combined condition, the e-confederate did the same as in the passive and active condition (both peer imitation and peer pressure).

In the control condition, participants completed the BART and received a message from the e-confederate at the end of the task, saying, "Hi, I liked doing the task, and you? Did you think it was difficult or not?" To make it convincing that there really was another participant, participants were given the opportunity to send a message back. Since an e-confederate was included in the control condition, the possible effects found in the other conditions could be attributed to the discouragement rather than solely to the presence of an e-confederate.

In the passive peer discouragement condition, the participants received two updates about the scores of the "other participant". The e-confederate took very little risk, as the number of pumps was approximately 40% lower compared to the average. MacLean et al. (2014) also used a 40% difference (a score 40% higher compared to the average instead of 40% lower) when measuring imitation. The mean number of pumps in the current study was based on the mean risk-taking score found in previous studies that used the BART to study adolescent risk taking (de Boer, Peeters, & Koning, 2016; Lejuez et al., 2007; Lejuez, Aklin, Zvolensky, & Pedulla, 2003). After 10 balloons, participants received an update saying, "The other participant gave the previous three balloons 20, 22, and 24 pumps. The other participant will give the next balloon 22 pumps." After 20 balloons, participants received another update saying, "The other participant gave the previous three balloons 19, 20, and

25 pumps. The other participant will give the next balloon 22 pumps." The same series of numbers was not used twice, as this would make the story that there was another participant (the e-confederate) less convincing. However, the series of numbers were very similar, and both had a mean of 22 pumps. Although the number of pumps given to the three previous balloons was determined at random, they were held constant across participants to enable a fair comparison. The participants were told about the number of pumps given to the three preceding and one balloon subsequent to give them the idea that the e-confederate gave very little pumps in general and that it was not a one-time decision. The pumps given to the three preceding and one subsequent balloon were mentioned because otherwise, passive peer discouragement would occur 30 times while active peer discouragement would not occur for every balloon, making the comparison of the relative importance of the influence mechanisms difficult. When a participant scored lower in the passive condition compared to the control condition, this indicated imitation.

In the active peer discouragement condition, participants received two risk-discouraging messages from the "other participant" and had two opportunities to send a message back immediately after receiving the risk-discouraging messages. After 10 balloons, the participant received a message from the e-confederate, saying, "If I were you, I would watch out that your balloons do not explode, and I would give the balloons very few pumps." After 20 balloons, the participant received another message, saying, "If I were you, I would really give the balloons very few pumps and watch out that they don't explode!" When a participant scored lower in the active condition compared to the control condition, this indicated an effect of active peer pressure.

In the combined condition, participants received two updates and two messages from the e-confederate, and they could send two messages back. These messages had the same content as those in the passive and active peer discouragement condition. When a participant scored lower in the combined condition compared to the control condition, this indicated a combined effect of peer pressure and imitation.

Procedure

Approval was obtained from the Ethics Committee of the Faculty of Social and Behavioral Sciences of Utrecht University. Parental passive consent was obtained, and the participation was completely anonymous and voluntary. The data collection took place in December 2014. Two secondary schools (N = 206, N = 63) were recruited to participate in the study. In each school, approximately six participants of the same gender were gathered from the classroom each time. Each group of participants completed the same condition to keep the instructions regarding the e-confederate consistent. The participants were seated behind a laptop, far away from each other, to make sure that they could not see each other's screens. They could not communicate verbally or nonverbally. Three research assistants were in the room to supervise and answer questions. When participants were seated behind a laptop, the experimenter communicated to the participants that they were going to complete a new computer task to see how well it worked (i.e., cover story). The participants were explained how to inflate the balloon and how to earn points while letting as few balloons explode as possible. The participants were told that they were going to complete a computer task at the same time as a participant from another school. Accordingly, they were informed that their computer would seek contact with a pupil from another school in the beginning of the task. To make sure that the participants would take the task seriously, they were told that the best scores would receive a prize (a voucher worth five euros). As mentioned by MacLean et al. (2014), implementing a prize also increases the ecological validity of decision making, because participants must weigh the potential gain of obtaining more points against the potential risk of losing points (Maner, Gailliot, Butz, & Peruche, 2007). In addition, in our experiment the experimenter mentioned to the participants that the participants from the other school (the e-confederate) could also win a prize, although they were not their direct opponents, as both schools had their own prizes. This was done to ensure that winning over the e-confederate was not the primary goal for participants.

Following the explanation of the "other participant" and the BART task in general, research assistants entered on the laptop whether the participants were male or female and emphasized to the participant that they had entered their gender. Next, the participant could read the instructions of the BART. Subsequently, the participants could inflate one practice balloon. The next screen displayed a message, "The computer is searching for another participant…. One moment please." After 30 s, the participant received a message saying that another participant of the same gender

was found. Then, the computer task started. After finishing the computer task, participants completed a questionnaire regarding their demographic characteristics, the computer task (questions assessed the likability, difficulty, and goal of the task to make the cover story about testing a new task convincing), and popularity. After all participants finished the questionnaire, they were all brought back to the classroom where new participants were randomly selected. After all data was collected, participants and their parents were debriefed and prizes were distributed. Research assistants handed out prizes to pupils with the most points and least number of exploded balloons. During their participation, pupils received a respondent number (to assure anonymity), and after the data collection the winning numbers were announced at both schools.

Measures

Actual risk taking. The Balloon Analogue Risk Task (BART) was used (Lejuez et al., 2007) to assess actual risk taking as the outcome variable. Elevated risk taking on the BART is associated with increased alcohol consumption, substance use, and self-reported measures of sensation seeking and impulsivity (Fernie, Cole, Goudie, & Field, 2010; Lejuez et al., 2003; MacLean et al., 2014; Pleskac, Wallsten, Wang, & Lejuez, 2008). In this version of the BART, participants had to press *p* (pump) to inflate the balloon and *s* (stop) to collect the points thus far. The balloon exploded between 1 and 128 pumps, with a mean breaking point of 65 pumps. For all participants, the balloons exploded at the same predetermined number of pumps and predetermined sequence (computerized algorithm). This was done to enable a fair comparison between participants and conditions. Participants inflated 30 balloons in total. Consistent with previous studies using the BART, the average number of balloons pumps that did not explode was used to compute the risk-taking scores (Lejuez et al., 2003, 2007). The overall mean score on the BART was created by dividing the total score of the unexploded balloons by the number of unexploded balloons. Separate mean BART scores were created for three ranges, namely, for balloons 1 through 10 (baseline measure serving as a covariate), balloons 11 through 20 (the balloons after the first risk-discouraging message/update), and balloons 21 through 30 (the balloons after the second risk-discouraging message/update). The mean score on the BART was created by dividing the average BART score of range 2 and range 3 by two. Range 1 was not included in the mean BART score so that the covariate remained independent from the dependent variable. A higher mean score indicated more risk taking.

Popularity. Using one item, participants were asked to indicate how popular they thought that they were in their school on a 5-point Likert scale ranging from *very unpopular to very popular*.

Analytic Strategy

Only one value was missing on the popularity variable; thus, listwise deletion was used for this missing case. There were no missing values on the BART variable or any of the other variables used for the analyses. The analyses were performed in Statistical Package for Social Sciences (SPSS) version 20. First, a randomization check was performed to investigate initial differences between conditions with regard to baselines BART scores and participant characteristics, even though the participants were randomly divided into conditions. Moreover, we examined whether the two schools differed on the descriptive variables and mean BART scores. Second, a manipulation check was performed by examining whether participants paid attention to the risk-discouraging messages and to the updates. Third, gender differences in the descriptive variables and mean BART scores were examined by performing analyses of variance (ANOVAs). Fourth, to determine whether the analyses should control for popularity, we investigated whether popularity influenced baseline and mean BART scores by conducting ANOVAs. To find answers to the proposed research questions, first, the effect of peer discouragement on adolescent risk taking was examined by performing an analysis of covariance (ANCOVA), with condition as a predictor of mean BART scores, while controlling for baseline BART scores. In addition, a repeated measures ANCOVA was conducted to examine the effect of the risk-discouraging messages over time. Second, to examine gender differences in the underlying peer influence mechanisms, an ANCOVA was used to evaluate the interaction between condition and gender.

RESULTS

Randomization Check

No significant differences emerged between participants across four different conditions at baseline in BART scores ($F(3, 265) = 0.21$, $p = .888$, partial

$\eta^2 < .01$), participant's age ($F(3, 265) = 0.63$, $p = .598$, partial $\eta^2 = .01$), gender ($\chi^2(3) = 0.34$, $p = .953$, $\phi = .04$), nationality ($\chi^2(3) = 0.44$, $p = .932$, $\phi = .04$), or which school they attended ($\chi^2(3) = 2.56$, $p = .465$, $\phi = .10$), indicating a successful randomization. Schools did not significantly differ on the self-reported popularity of the adolescents ($F(1, 266) = 3.26$, $p = .072$, partial $\eta^2 = .01$) or mean BART scores ($F(1, 266) = 0.71$, $p = .401$, partial $\eta^2 < .01$) when controlling for baseline differences. Therefore, the participants from both schools were analyzed together.

Manipulation Check

Of the participants who received two updates, 80% correctly indicated the number of pumps the other participant had given his or her balloons on average, and 12% was up to 10 pumps off. The other 8% indicated that they did not know how many pumps the other participant used to blow his or her balloon on average. Furthermore, 93% of the participants who received a risk-discouraging message from the other participant wrote down the content of the message while the other 7% wrote down nothing or misunderstood the question. The participants who could not replicate the number of pumps or the content of the risk-discouraging messages did not differ significantly in the mean BART scores from those who could recall this information while controlling for baseline BART scores, $F(1, 132) = 2.00$, $p = .159$, partial $\eta^2 = .01$, and $F(1, 129) = 2.39$, $p = .124$, partial $\eta^2 = .02$, respectively, for the number of pumps and message content. Therefore, they were not removed from the data file. Given that nearly all participants paid much attention to both the active and passive risk-discouraging messages, manipulation seemed to be successful.

The Effect of Peer Discouragement on Adolescent Risk taking

As can be observed in Table 1, condition was a significant predictor of mean BART scores while controlling for baseline BART scores. Pairwise comparisons (with Bonferroni as a statistical adjustment for multiple comparisons) showed that participants in the combined condition ($M_{combined} = 39.34$, $SE = 1.36$) took significantly less risk compared to participants in the control condition ($M_{control} = 44.93$; $SE = 1.34$, $p = .022$). Participants in the passive ($M_{passive} = 45.23$, $SE = 1.33$) and active discouragement condition ($M_{active} = 42.57$, $SE = 1.36$) did not significantly differ on BART scores compared to the participants in the neutral condition. Participants in the combined discouragement condition also took less risk compared to those in the passive peer discouragement condition ($p = .013$). The differences between the other conditions were all nonsignificant.

TABLE 1
Influence of Condition, Time, Gender, Age, and Popularity on Mean BART Scores While Controlling For Baseline BART Scores

	F	Df_1; df_2	*p*	Partial η^2
Condition	4.09	3; 264	.007	.04
Time	0.32	1; 264	.573	<.01
Gender	3.92	1; 260	.049	.01
Age	0.66	5; 247	.652	.01
Popularity	0.28	4; 250	.892	< .01
Condition × Time	2.12	3; 264	.098	.02
Condition × Gender	1.17	3; 260	.320	.01
Condition × Age	0.56	12; 247	.875	.03
Condition × Popularity	0.68	9; 250	.729	.02

Note. Results of different test are displayed in one model. Four univariate models (with baseline BART scores as a covariate) were run: one with only the main effect of condition, one with the main and interaction effects of condition and gender, one model with the main and interaction effect of popularity and condition and one model with the main and interaction effects of age and condition. One repeated measures model was run with time as a main effect and the interaction between time and condition.
df_1: hypothesis *df*; df_2: error *df*.

The results of repeated measures ANCOVAs with range 2 (balloons after first message/update) and range 3 (balloons after second message/update) as time points and range 1 (balloons before the messages/updates) as a covariate are displayed in Figure 1. The analysis revealed no significant influence of time on mean BART scores, indicating that the multiple messages did not have an additional effect on mean BART scores. The interaction between time and condition was also nonsignificant, indicating that the influence of time on risk-taking scores did not differ significantly across conditions. The results of the repeated measures ANCOVA are displayed in Table 1.

Gender Differences in the Relative Importance of the Peer Influence Mechanisms

As can be observed, gender was a significant predictor of risk taking, with boys ($M = 44.28$, $SE = 0.91$) scoring a little higher on the BART compared to girls ($M = 41.63$, $SE = 0.98$). The interaction between gender and condition while controlling for baseline BART scores and including the main effects of condition and gender was nonsignificant, $F(3, 260) = 1.17$, $p = .320$, partial

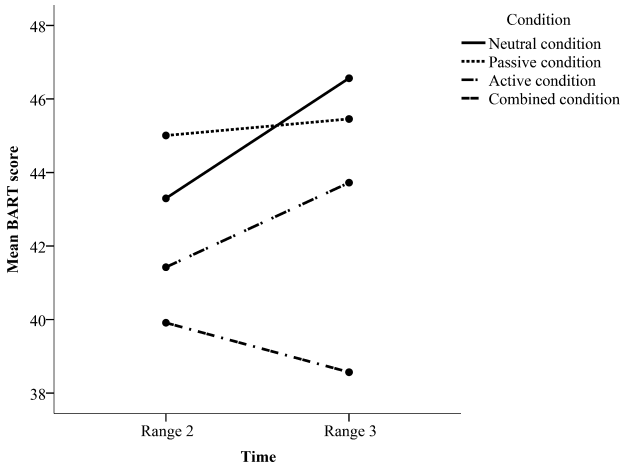

FIGURE 1 Effect of time on mean BART scores in the four different discouragement conditions while controlling for baseline BART scores. *Note.* It must be noted that to zoom in on the differences between conditions, the *y*-axis shows the number of pumps between 38 and 48.

$\eta^2 = .01$. Thus, the overall influence of condition appeared to be the same for boys and girls. Peer discouragement did not affect the risk-taking behavior of boys and girls differently.

Additional Analyses: The Influence of Popularity and Age

Girls ($M = 3.00$, $SD = 0.57$) perceived themselves to be less popular compared to boys ($M = 3.23$, $SD = 0.57$, $p = .002$). Self-reported popularity of the participant did not predict the mean BART scores when controlling for baseline BART scores. The interaction between popularity and condition was also nonsignificant, indicating that the influence of peer discouragement on risk-taking scores did not differ by the level of popularity of the participant. The results are presented in Table 1. As can be observed in this table, the age of the participant did not affect the risk-taking scores or the effectiveness of discouragement on the risk-taking scores.

DISCUSSION

The aim of this experimental study was to investigate the effect of active and passive peer discouragement on adolescent risk taking. Previous studies that have focused on discouragement of risk taking among early and middle adolescents did not examine both discouraging mechanisms in one experimental design. In the study presented in this article, it was expected that both active and passive peer discouragement would have an effect on risk taking of early and middle adolescents and that especially the combination of both processes would result in a decrease in risk taking. This hypothesis was partly confirmed, as the combination of active and passive peer discouragement indeed resulted in a significant decrease in risk taking. Contrary to expectations, solely active or solely passive peer discouragement did not result in a significant decrease in risk taking. This indicates that peers need to "practice what they preach." They need to see that the peer who is discouraging them to take risk also takes less risk him or herself. This finding is in contrast with the study of Harakeh and Vollebergh (2011) who found that active discouragement to smoke did not have an additional diminishing effect on young adults' smoking over and above being in the presence of a nonsmoking peer. In the current study, what the peer said did have an additional influence on how the adolescent acted in that only the combination of active and passive discouragement resulted in a decrease of risk taking. These contrasting findings might be explained by the fact that Harakeh and Vollebergh (2011) focused on young adults instead of early or middle adolescents. Compared to young adults, early and middle adolescents might feel more need to fit in and conform to the norm, but as they are less socially confident (Borsari & Carey, 2001), they might also need an explicit discouragement instead of only a behavioral example. Future research should investigate whether the effect of discouragement might be different for early and middle adolescents compared to late adolescents and young adults. In addition, the study of Harakeh and Vollebergh (2011) focused on risk behavior (e.g., smoking) instead of more general risk taking. The current study measured risk taking through decisions that have to be made in a split second, whereas behavior such as smoking consists of motivational and/or learning components (Reyna & Farley, 2006).

Furthermore, the study of Harakeh and Vollebergh (2011) used a real-life confederate whereas the current study used an e-confederate. The focus on young adults and the use of a real-life confederate may also explain why some studies found an effect of only passive (Duan et al., 2012) or only active peer discouragement (Audrey et al., 2006; Pfeffer & Hunter, 2013) whereas the current study did not. In the current study, observing the behavior of a real peer directly instead of receiving only an update or a message without direct observation could have had a stronger effect on the behavior of the adolescent. Hence, future research should

replicate the current study with a real confederate to investigate whether the combination of both processes still reduces risk taking or whether only active or only passive peer discouragement suffices to accomplish this effect.

Another influential factor in the current study could be the peer who was a complete stranger whereas in the other experimental studies the peer often was someone familiar. It is conceivable that adolescents would respond in a different way to advice from someone they know compared to someone they do not know. On the one hand, an adolescent might trust the advice of a friend more than the advice of a stranger. On the other hand, adolescents might conform more to the advice of someone who is not already a friend, especially when the peer has a high status (Bot, Engels, Knibbe, & Meeus, 2005). Future research should investigate whether the familiarity or friendship with the peer influences the effectiveness of risk discouragement.

The findings of the current study are in line with the results regarding risk encouragement, which revealed a significant increase in the participants' risk taking only when a peer demonstrated high risk taking and encouraged the participant to take more risk (MacLean et al., 2014). The results of MacLean et al. (2014) might explain the finding that only a combination of active and passive peer discouragement resulted in a significant decrease in risk taking. The researchers suggested that participants who received messages from a peer and observed the risk taking of the peer might have perceived the advice with regard to changes in risk taking as unambiguous, increasing the influence of the messages on risk taking of the adolescents. In contrast, only observing the scores of the peer or only receiving risk-discouraging messages might have been perceived as unreliable information. Therefore, the effect of the advice might have been reduced when peers did not demonstrate the behavior that they were advocating (MacLean et al., 2014).

Additionally, it was found that the second risk-discouraging message overall did not have an additional effect on risk-taking scores over and above the effect of the first risk-discouraging message. This might have been the case because the first risk-discouraging message and/or update already had a clear message; therefore, the second risk-discouraging message and/or update might not have had an additional influence, since it might have been perceived as a repetition. Additionally, the different discouragement mechanisms (i.e., active and/or passive risk discouragement) did not result in a significantly different change in risk-taking scores over time, as the interaction effect between time and condition was nonsignificant. Thus, overall, multiple risk-discouraging messages did not result in a significantly stronger decrease in risk taking over time, but also did not result in a significant increase over time, which indicates that multiple risk-discouraging messages also did not have an adverse effect.

Moreover, gender differences in the overall effect of peer discouragement on risk taking were nonsignificant. This indicates that boys and girls did not differ significantly in the overall effect of condition. These results contradict Cullum et al.'s (2012) conclusion that active and passive peer influences have significantly different effects on men and women. Boys are more susceptible to peer influence compared to girls; however, this appears to be true only with regard to risk encouragement (Sumter et al., 2009) but not risk discouragement. Boys might be more likely to conform to risk-encouraging norms that are either passively modeled (passive peer encouragement) or actively communicated to them (active peer encouragement), because engaging in risk taking and appearing "tough" is part of boys' but not girls' reputation (Hartup, 1996). Therefore, gender differences in the effectiveness of risk encouragement might be larger compared to the gender differences in the effectiveness of risk discouragement. As decreasing risk taking is less likely to increase an adolescent's status, the difference between boys and girls in the effectiveness of risk discouragement might be smaller. Consequently, girls and boys might respond equally to active and/or passive peer discouragement. Adolescents use their peers as a reference point, and when they encounter risk discouragement and observe the low risk taking of their peers, they might adapt their behavior by decreasing their risk taking because they want to fit in with their peers.

The current study examined the influence of risk discouragement by only one peer who was a complete stranger to the adolescent. As early and middle adolescents spend a lot of time with their peers (Dunphy, 1963), it might be interesting for future studies to focus on the influence of peer discouragement by larger groups. In line with social impact theory (Latané, 1981), it is conceivable that discouragement of a larger group of peers might have a greater effect on an adolescent's risk-taking behavior. Yet, the effect of the group may also depend on other factors, such as the closeness the adolescent

feels toward the group and the adolescent's status in that particular group (Brown & Dietz, 2009). For example, a clique may exert a greater influence because individuals feel that they belong, whereas in a larger crowd peers may not experience close friendships. Adolescents in social hierarchy groups (in which status difference exists), compared to more egalitarian groups, may also influence the degree to which adolescents are susceptible to the influence of their peers (Closson, 2009). Therefore, it might be the size of the group, peer status, and the closeness of friendships together that might determine the effectiveness of peer discouragement of risk taking. Another factor that can influence the effectiveness of discouragement is the peer influence susceptibility of the adolescents. Some adolescents are susceptible to the influence of their peers to a higher degree compared to others (Allen, Porter, & McFarland, 2006), and it is important to identify the characteristics of these individuals. Moreover, it would be interesting for future studies to examine what the adolescents decide to do when they receive both risk-encouraging and risk-discouraging advice from different peers. Gaining more insight into the circumstances (e.g., size of the peer group, heterogeneity of the group) under which risk discouragement is most successful could increase the effectiveness of interventions in reducing adolescent risk taking.

Strengths and Limitations

The current study provided insight into the mechanisms that influence peer discouragement. However, this study had some limitations. The first limitation concerned the generalizability of the study results. This study focused only on two Dutch secondary schools; it is unknown whether these results are generalizable to other cultures, educational levels, and ethnic minorities. Yet, it might be expected that the results regarding the underlying mechanisms can be generalized to other early and middle adolescents who were born in the Netherlands with an educational level of higher general or preuniversity level. It would be interesting to investigate whether the current findings can also be generalized for lower educational levels and a more ethnic diverse sample.

Second, only the discouraging influence of a same-gender peer was examined. Additionally, including an opposite gender e-confederate would have required a sample approximately twice as large as the current sample, which was beyond the scope of the current study. A same-gender e-confederate was chosen because in early and middle adolescence youth engage mainly in single-gender peer groups (Dunphy, 1963). It is interesting for future studies to investigate discouraging influences that an opposite gender e-confederate could have on adolescent risk taking, because feeling a romantic attraction, for example, might influence the decision making of the adolescent (Van Straaten, Engels, Finkenauer, & Holland, 2008). As mentioned earlier, it is also important to examine whether the same results would be found when the peer who is discouraging the adolescent is familiar rather than unfamiliar. Furthermore, the influence of multiple peers (a peer group) should be examined instead of only a dyadic peer relationship, as in real life, adolescents interact with multiple peers.

Despite these minor limitations, the current study also had several strengths. First, it provided insights into the process of peer discouragement of adolescent risk taking while most studies have focused on risk encouragement. As risk discouragement appears to be present more often than risk encouragement (Urberg et al., 1990), it is important to focus on the ways in which peers could decrease adolescent risk taking. Second, both active and passive peer influence mechanisms were examined in one experimental design using a relatively large sample. This enabled us to draw conclusions regarding the relative importance of passive and active peer discouragement. It was important to know not only whether peer discouragement could be effective in reducing risk taking, but also how this could be accomplished (i.e., by modeling or peer pressure). Third, the current study focused on early and mid-adolescence, which was very important, as peer influence susceptibility is the highest at these ages (Steinberg & Monahan, 2007). Fourth, the current study was the first to examine gender differences in the relative importance of passive and active peer discouragement of risk taking. To determine whether the interventions should be made more gender-specific, we deemed it important to investigate whether the effects of these mechanisms differed for boys and girls.

CONCLUSION

The current study provided insight into the mechanisms underlying peer discouragement of risk taking in early and middle adolescence. It was found that peer discouragement could be effective in reducing adolescent risk taking. A combination of active (peer pressure) and passive (modeling) peer

discouragement resulted in a significant decrease in risk taking. Solely active or solely passive peer discouragement did not result in a significant decrease in risk taking. This indicates that adolescents need to observe that the peer who is discouraging them to take risk also takes less risk. Hence, to decrease adolescent risk taking, peers need to practice what they preach. The overall effect of discouragement did not differ by gender. Interventions should combine passive and active peer discouragement as well as digital communication to reduce risk taking among early and mid-adolescents. Peers, familiar and unfamiliar ones, can reduce adolescent risk taking even when the interaction between them is brief. Hence, interventions designed to reduce risk taking could be administered via social networking sites (MacLean et al., 2014), given that social media sites are very important in the lives of adolescents.

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