*Research Article*

Psychological Science
1–9

DOI: 10.1177/0956797615620379
pss.sagepub.com

# Adolescents in Peer Groups Make More Prudent Decisions When a Slightly Older Adult Is Present

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## Abstract

Adolescents make more reckless decisions when with peers than when alone, which poses a challenge for organizations that place adolescents in situations in which risky and myopic decision making is problematic. We asked whether the effect of peers on adolescents' decision making is mitigated by the presence of a slightly older adult. We examined whether target subjects' risk taking was greater when they were in groups of 4 late-adolescent males (ages 18–22) than when they were in groups that mixed 3 late-adolescent males with 1 slightly older adult (age 25–30); risk taking in both of these conditions was compared with that of adolescents tested alone. We found that adolescents took more risks and expressed stronger preference for immediate rewards when they were grouped with 3 same-age peers than when they were alone. When 1 adolescent was replaced by someone slightly older, however, adolescents' decision making and reward processing resembled that seen when adolescents were tested alone. Adding a young adult to a work team of adolescents may improve group decision making.

## Keywords

adolescent development, risk taking, decision making, judgment, intergroup dynamics

Received 8/11/15; Revision accepted 11/9/15

Most forms of risky behavior, including activities that jeopardize health and well-being, are more common during adolescence than before or after (Willoughby, Good, Adachi, Hamza, & Tavernier, 2013). One hallmark of adolescents' relative propensity to engage in risk taking, especially in comparison with adults, is that it often is manifested in groups (Albert, Chein, & Steinberg, 2013). For example, rates of automobile crashes are higher among teen drivers with teen passengers than among teenagers driving alone or adults driving with passengers (Ouimet et al., 2010; Simons-Morton, Lerner, & Singer, 2005), and the rate of group crimes relative to solo crimes is higher among youthful offenders than among adult criminals (Zimring & Laqueur, 2015). This group influence on adolescents' risk taking also has been demonstrated in experimental studies in which individuals of different ages have been randomly assigned to perform risk-taking tasks either alone or in the presence of real or illusory peers (e.g., Chein, Albert, O'Brien, Uckert, & Steinberg, 2011; Gardner & Steinberg, 2005; Smith, Chein, & Steinberg, 2014). These experiments typically show that the presence of peers increases risk taking among youth (including individuals in their early 20s), but not among adults (Albert et al., 2013).

The present study investigated whether the age mix of the social audience—in particular, the presence of an older individual—affects the outcome of late adolescents' decision making when they are in groups. Studying the impact of an adult's presence on adolescents' risk taking can help clarify understanding of adolescents' susceptibility to social influences on decision making. Such research also has potentially important practical implications for the many organizations and institutions that assign individuals of different ages, including adolescents, to work together in groups. Although we specifically designed this

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study to simulate a common military practice of forming four-member fireteams during combat operations, the study also has clear relevance for establishments in the civilian workplace (e.g., restaurants and retail stores) and the community (e.g., volunteer organizations). For example, nearly one third of employees in the fast-food industry are teenagers (Schmitt & Jones, 2013), as are one sixth of individuals in the U.S. Marine Corps (U.S. Department of Defense, 2011).

Although the notion that the presence of adults discourages adolescents' risk taking may strike some readers as self-evident, virtually all of the extant research on this topic has focused on correlations between parental monitoring and teen misbehavior, and the direction of causal influence has been called into question (Stattin & Kerr, 2000). Little is known about how the presence of nonfamilial adults affects decision making in groups of adolescents. Also notably absent from the literature are studies in which the presence of adults has been experimentally manipulated to determine whether the presence of an adult leads to a reduction in risk taking (for a recent exception, however, see Telzer, Ichien, & Qu, 2015). In the present study, we investigated how the presence of peers affects decision making among late adolescents (ages 18–22) and whether the previously documented effect of peers on adolescents' risk taking can be reduced or reversed by the presence of a slightly older adult (age 25–30).

It is important to note that we were not interested in whether adolescents' decision making is affected by adults' active encouragement of safer choices. Indeed, evaluations of informational interventions designed to explicitly discourage risk taking among adolescents have cast doubt on their effectiveness (Steinberg, 2015). Rather, central to our theory is the idea that the impact of peers on adolescents' risk taking is often unconscious, and that the presence of peers increases risky behavior via the fundamental processes that adolescents engage to evaluate potential and received rewards. Specifically, evidence suggests that the peer effect on risk taking occurs because peers heighten adolescents' sensitivity to potential rewards (Chein et al., 2011; Smith, Steinberg, Strang, & Chein, 2015). This is especially true for immediately available rewards, as reflected in studies demonstrating that late adolescents' discounting of delayed rewards on temporal-discounting tasks is steeper when the adolescents are observed by peers than when they are alone (O'Brien, Albert, Chein, & Steinberg, 2011; Weigard, Chein, Albert, Smith, & Steinberg, 2014). Given the heightened importance of same-age peers during adolescence, we did not expect that the presence of an adult would have a similar effect on reward sensitivity or, as a consequence, risk taking.

We explored whether the mechanisms that influence sensitivity to immediate rewards might similarly account for the moderating impact of an adult's presence on risky decision making. Specifically, we tested the hypotheses that (a) the presence of a somewhat older adult mitigates the peer effect on adolescents' risk taking and (b) this mitigation is explained by attenuation of the impact of peers on adolescents' preference for immediate rewards.

## Method

The study is part of a broader program of research, funded by the U.S. Army, designed to inform military decisions about how best to group soldiers into combat teams. Accordingly, the sample was limited to males in late adolescence, who disproportionately make up the squads sent into battle. All procedures were approved by Temple University's institutional review board, as well as that of the U.S. Army.

Volunteers between the ages of 18 and 22 were recruited from local colleges and the general Philadelphia, Pennsylvania, community. Subjects were also recruited through the subject pool of Temple University's introductory psychology course. We compared subjects' behavior across three social-context conditions: (a) *solo*, in which subjects were tested alone; (b) *peer-group*, in which target subjects were tested while being observed by 3 same-age male peers; and (c) *adult-present*, in which target subjects were tested while being observed by 2 same-age male peers and an older male confederate (between 25 and 30 years old). The latter two conditions—each involving groups of 4 individuals—were meant to simulate the fireteams employed in the military, although they also are relevant to the composition of work teams in many employment settings in which adolescents and adults work together. All subjects (targets and observers across all conditions) were paid $35 (or received 2.5 research credits) for their participation.

Testing was completed in two phases. In the first phase, we recruited and tested subjects in the solo and peer-group conditions. In the second phase, we recruited and tested subjects in the adult-present condition. We halted recruitment once a predetermined target of 100 subjects per experimental condition was met. This target sample size was based on the effect sizes ($d$ = 0.47 and $d$ = 0.40, respectively) we obtained in two prior studies of the peer effect in this age group (Gardner & Steinberg, 2005; O'Brien et al., 2011). With an expected effect size of approximately 0.40, a total sample of 100 per condition provides adequate power (> .80) to detect a significant effect ($p$ < .05). Although there were 100 target subjects in each condition, the analyses reported here are based on data from 95 target subjects in the solo condition, 95 target subjects in the adult-present condition, and 100 target subjects in the peer-group condition. Ten

target subjects were excluded from the analyses because their data were incomplete.

## Procedure

To encourage participation by peers who were familiar with one another, we asked interested subjects whether they had any friends (other males between 18 and 22) who might also be interested in participating. If a subject referred a friend to the study, our research team communicated directly with that individual to confirm his eligibility.

For each session in the first phase (the solo and peer-group conditions), 5 subjects, some of whom were friends and some of whom were strangers, were independently scheduled to participate at a set time, but none was informed that he might participate as a member of a group. When the 5 subjects arrived at the lab, 4 were randomly assigned to the peer-group condition, and 1 was randomly assigned to participate alone. Subjects in the two conditions were escorted to separate rooms and instructed about the study. In the peer-group condition, 1 subject (the target) was randomly selected to complete a test battery while the other 3 observed. After giving verbal consent, the subjects in this condition were left in the room for approximately 10 min, to provide them an opportunity to interact naturally.

The main procedural difference in the second phase of the study (the adult-present condition), was that 3, instead of 4, volunteers were scheduled for each experimental session, and the group was completed by a study confederate (age 25–30), who served as the adult observer. (As we discuss later, there were no demographic differences between subjects in this phase of the study and those in the first phase.) Twelve confederates (all of whom were graduate students) took turns participating. Prior to the sessions, each confederate was instructed to refrain from giving information about the experiment, revealing his familiarity with the paradigm or social-context manipulation, or explicitly providing advice to the subjects who completed the test battery.

When subjects in the adult-present condition arrived at the lab, all were escorted to a testing room and instructed about the study. As in the peer-group condition, 1 subject was selected to complete the test battery while the others observed, but in this case, the selection of the target subject was rigged so that the adult confederate was never selected. In addition, before the experimenter left the testing room to let the subjects and confederate interact naturally for 10 min, they were asked to introduce themselves—to share their name and their year in school (if a student). The purpose of this introduction was to implicitly indicate to the subjects that the group included an older person, who always indicated his status as a graduate student (i.e., a "higher ranking" individual).

The percentage of subjects who had at least one friend in their group was similar in the peer-group (56%) and adult-present (59%) conditions. Behavior of the target subjects—in either the peer-group or the adult-present condition—did not differ as a function of how many of their fellow group members they knew prior to the study.

***Demographics.*** Subjects in all three conditions reported their age, race-ethnicity, and years of education. They also reported their parents' educational attainment, which was used as a proxy for socioeconomic status. Ninety-one percent of the target subjects were current college students, and their mean age was 19.74 years ($SD$ = 1.27). Sixty-one percent were White, 9% were Black or African American, 20% were Asian or Pacific Islander, 6% were Latino, and 4% were of other or mixed races. The three conditions (solo, peer-group, adult-present) did not differ on any demographic variables for the target subjects (see Table 1, which also summarizes the demographic characteristics of the peers and confederates).

***Risk taking.*** We used the Stoplight game (Steinberg et al., 2008) to measure risk-taking behavior. Stoplight is a simple computerized driving task in which subjects control the progression of a vehicle along a straight track,

**Table 1.** Demographic Characteristics of the Target Subjects, Peers, and Confederates

| | Solo condition | Peer-group condition | | Adult-present condition | | |
|---|---|---|---|---|---|---|
| Characteristic | Targets ($n$ = 95) | Targets ($n$ = 100) | Peers ($n$ = 300) | Targets ($n$ = 95) | Peers ($n$ = 190) | Confederates ($n$ = 12) |
| Mean age (years) | 19.88 (1.25) | 19.79 (1.20) | 19.77 (1.25) | 19.59 (1.32) | 19.69 (1.33) | 27.17 (1.80) |
| Race (% White) | 60 | 54 | 55 | 69 | 70 | 75 |
| Education (years) | 14.34 (0.87) | 14.30 (0.95) | 14.24 (0.99) | 13.95 (1.29) | 13.96 (1.33) | 17.75 (0.62) |
| Parental education[a] | 15.09 (1.99) | 14.81 (2.11) | 15.11 (2.09) | 15.10 (2.02) | 14.83 (1.97) | 15.54 (2.41) |

Note: Standard deviations are given in parentheses.
[a]Educational attainment of the parents was used as a proxy for socioeconomic status (13 = some college education, 16 = college degree).

from the driver's point of view. A timer appears prominently on the screen. Subjects are instructed that their goal is to reach the end of the track as quickly as possible and that a traffic signal will turn yellow as they near each of 32 intersections. At each intersection, they must decide whether to stop the car (by using the space bar), and wait for the light to cycle from yellow to red to green, or go through the intersection. Subjects are informed that if they decide to brake, the car will stop safely, but they will lose time waiting for the light to cycle back to green. They are also told that if they decide to go through the intersection, the car may cross the intersection successfully, so that they will save time, or the car may crash into a crossing vehicle (an event that is accompanied by squealing tires and a loud crash, as well as the image of a shattered windshield), so that they will lose even more time than if they had decided to brake. Thus, subjects must decide whether to drive through the intersection in order to save time, but chance a collision with another vehicle that will cause them to lose time, or to stop and wait, and willingly lose a smaller amount of time. Risky decisions offered the potential payoff of experiencing no delay, but also the potentially costly consequence of a crash, which added significantly to the delay.

In short, at each intersection, the subjects could (a) stop, (b) cross successfully, or (c) crash (as a result of either failure to brake or taking too long to brake after the light turned red). Both the timing of the traffic signals and the probability of a crash in these intersections were varied so as to be unpredictable by the subjects. We computed a risk-taking score for each subject as the proportion of the 32 intersections at which the brakes were not applied (regardless of whether the subject crashed or ran the intersection successfully).

Risk taking (i.e., not braking at a yellow or red light) was encouraged by offering monetary incentives for completing the course in a timely fashion. Specifically, all target subjects (across conditions) were informed that, in addition to their baseline compensation, they could earn a $15 bonus depending on how they performed on the task. They were told that their performance would be evaluated against a "performance threshold" that was based on how well past subjects had performed on the task, and that they would receive the bonus if they reached the threshold, which was unknown to the experimenter. In actuality, there was no performance threshold, and all subjects received the bonus regardless of their performance. This incentive manipulation was meant to force subjects to pit possible gains (i.e., saving some time by running the lights) against possible losses (i.e., losing more time if they crashed when they ran the lights). Moreover, in an attempt to reproduce some of the cohesion that is often characteristic of real-world peer groups, such as combat units in the military or projects teams in the workplace, we informed subjects in the two group conditions that each observer's potential $15 bonus depended on the behavior of the target subject. Therefore, the target subject had to consider how the potential gains and losses resulting from his decisions affected not only his own ultimate reward, but also that of his team members. Incentivizing subjects in this manner was meant to induce solidarity and teamwork, as these factors are important features of most real-world group settings.

***Preference for immediate rewards.*** We used a delay-discounting task to measure preference for immediate versus delayed rewards (Steinberg et al., 2009). In the task, subjects were presented with a series of choices between a relatively small, immediate reward and a larger, delayed reward (e.g., "Would you rather have $200 today or $1,000 in 1 year?"). They were informed that there was no right or wrong answer and that they should simply choose which of the two (hypothetical) options they preferred. In contrast to the Stoplight game, the delay-discounting task was clearly introduced as a measure of preference, not performance. The experimenter explicitly stated that subjects' choice had no impact on their final compensation; therefore, we have no reason to believe that the bonus incentive offered for performance on the Stoplight game carried over to influence preference in the delay-discounting task. By removing this contingency, we ensured that the delay-discounting task remained a measure of reward processing outside the context of risk, so that the task simply involved a choice between a smaller reward received sooner and a larger reward received later.

The outcome of interest in delay discounting is the extent to which subjects prefer the immediate but less valuable reward over the delayed but more valuable one. In our adaptation of the task, the amount of the delayed reward was held constant at $1,000. We varied the delay interval across six blocks (1 week, 1 month, 6 months, 1 year, 5 years, and 15 years), presented in a random order. In each block, the starting value of the immediate reward was $200, $500, or $800, randomly determined for each subject. The subject was then asked to choose between the immediate reward and a delayed reward of $1,000. If the immediate reward was preferred, the subsequent question presented an immediate reward midway between the prior one and zero (i.e., a lower figure). If the delayed reward was preferred, the subsequent question presented an immediate reward midway between the prior one and $1,000 (i.e., a higher figure). The subject worked his way through a total of nine ascending or descending choices until his responses converged, and his preferences for the immediate and delayed rewards were equal, at a value reflecting the discounted value of the delayed reward (i.e., the subjective

value of the delayed reward if it were offered immediately; Green, Myerson, & Macaux, 2005), which is referred to as the *indifference point* (Ohmura, Takahashi, Kitamura, & Wehr, 2006). The task generated six indifference points (one for each delay interval).

For each individual, we computed the average indifference point (across all delay intervals) and the discount rate. The discount rate is an index of the degree to which an individual devalues a reward as a function of the length of delay until receipt, which we computed using the standard equation, $V = A/(1 + kD)$, where $V$ is the subjective value of the delayed reward (i.e., the indifference point), $A$ is the actual amount of the delayed reward, $D$ is the delay interval, and $k$ is the discount rate. Because, as is usually the case, the distribution of $k$ was highly positively skewed in our sample (i.e., skew = 6.160), we employed a natural-log transformation to reduce skew to an acceptable level (−0.572). Lower indifference points and higher log-transformed discount rates indicate a greater orientation toward immediate relative to future reward. In the present sample, the correlation between the average indifference point and discount rate was significant, $r(290) = -.966$, $p < .001$.

As expected, given that the Stoplight and delay-discounting tasks are thought to measure different phenomena, the measures of risk taking and delay discounting (discount rate) were not significantly correlated, $r(290) = .085$, $p = .152$.

### *Statistical analysis*

To estimate effects of social context on risk-taking behavior, we fitted linear regression models to the Stoplight risk-taking index using the maximum likelihood (ML) estimation method in Mplus (Version 7.0; Muthén & Muthén, 2012). Social context (solo, peer-group, or adult-present condition) was the main predictor of interest. To test behavioral differences between subjects across the social-context conditions, we created 3 dummy variables, 1 to represent each condition. Depending on the comparison of interest, 1 of these 3 dummy variables was excluded from the model to serve as the reference group. In addition, 11 dummy-coded (0, 1) covariates of no interest were included in the model to account for the confederate's identity in the adult-present condition (the confederate who participated most frequently served as the reference category, and hence was not coded in the model). For all subjects in the solo and peer-group conditions, these 11 dummy variables were coded as 0 (because no adults were present in those experimental conditions). Terms for the interactions between each of the 11 confederate dummy variables and the adult-present dummy variable were also included in the model. Including the confederate dummy variables and these interactions allowed us not only to account for any variability due to the use of different confederates, but also to test whether any observed relations between the adult-present condition and task outcome were driven by a particular confederate.

For the delay-discounting task, we first conducted a repeated measures analysis of variance to test whether the typical delay-discounting pattern was observed across the entire sample. The indifference point at each delay interval was used as the within-subjects measure, and social context (three conditions: solo, peer-group, adult-present) was used as the between-subjects measure. To estimate effects of social context on average indifference point and on discount rate, we then fitted regression models using the ML estimation method in Mplus. As in the analysis of risk taking, 11 dummy variables corresponding to the confederate's identity, and their interactions with the adult-present dummy variable, were included in the models to control for intragroup variability within that condition and to test whether any relation between social context and behavior on the delay-discounting task was moderated by confederate's identity.

## Results

### *Does the presence of an adult reduce peers' influence on risk-taking behavior?*

Figure 1 summarizes the results for the Stoplight game. As expected, relative to solo subjects, those in the peer-group condition took significantly more risks during this game, $\beta = 0.10$, 95% confidence interval (CI) = [0.06, 0.13], $p < .001$, $d = 0.61$. In contrast, risk taking among subjects in the adult-present condition (who were observed by two same-age peers and an adult confederate) did not differ from that of solo subjects, $\beta = -0.01$, 95% CI = [−0.07, 0.06], $p = .83$, $d = 0.03$. Further, subjects in the peer-group condition also took significantly more risks than those in the adult-present condition, $\beta = 0.10$, 95% CI = [0.04, 0.17], $p = .002$, $d = 0.41$. Thus, these results indicate that the presence of peers increases risk-taking behavior among late adolescents, but when a slightly older adult is introduced in a peer setting, their risk-taking behavior is similar to that observed when they are tested alone.

### *Does the presence of an adult reduce peers' influence on preference for immediate rewards?*

***Indifference point.*** The analysis of variance revealed a significant effect of delay interval, $F(5, 290) = 900.69$,

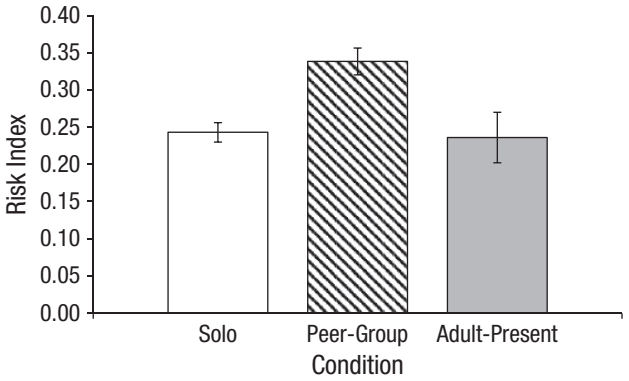


**Fig. 1.** Risk-taking behavior (average risk index) of the target subjects in the three social-context conditions. Error bars represent ±1 *SE*.

$\eta^2 = .75$, $p < .001$. The typical delay-discounting pattern was observed across the entire sample: Indifference-point values decreased as delay intervals increased. Results for the three social-context conditions separately are summarized in Figure 2. As hypothesized, a significant effect of condition was found, $F(2, 290) = 3.14$, $\eta^2 = .02$, $p = .045$; subjects in the peer-group condition evinced a lower average indifference point ($M$ = \$533.81, 95% CI = [461.28, 606.33]) than did those in the solo condition ($M$ = \$587.81, 95% CI = [557.59, 618.03]) or the adult-present condition ($M$ = \$566.02, 95% CI = [493.07, 638.96]). The difference in average indifference points between the solo and peer-group conditions was statistically significant, $\beta = -54.00$, 95% CI = [−96.31, −11.70], $p = .012$, $d = 0.29$, but the difference between the average indifference points in the peer-group and adult-present conditions was only marginally so, $\beta = 32.21$, 95% CI = [−10.10, 74.52], $p = .134$, $d = 0.15$. Notably, the average indifference point did not vary between the solo and adult-present conditions, $\beta = -21.79$, 95% CI = [−64.53, 20.94], $p = .317$, $d = 0.12$. Thus, these results indicate that the increase in the degree to which late adolescents discount delayed rewards when they are in the presence of peers (relative to when they are alone) is significantly reduced when there is an adult present.

***Discount rate.*** Results for discount rates paralleled those for average indifference points (Fig. 3). Recall that higher discount rates (i.e., values closer to 0) indicate a greater orientation toward immediate relative to future reward. Subjects in the peer-group condition exhibited a higher discount rate compared with those in the solo condition, $\beta = 0.65$, 95% CI = [0.22, 1.09], $p = .003$, $d = 0.34$, whereas the discount rate did not differ between solo subjects and those in the adult-present condition, $\beta = 0.27$, 95% CI = [−0.32, 0.86], $p = .374$, $d = 0.11$. Subjects in the adult-present condition demonstrated an intermediate discounting rate that also did not differ from the rate of those in the peer-group condition, $\beta = -0.38$, 95% CI = [−0.97, 0.20], $p = .198$, $d = 0.16$. In summary, subjects who were observed by 3 same-age peers exhibited a stronger preference for more immediate rewards than did those who performed the task alone. When an older adult replaced 1 member of the peer group, however, the presence of peers no longer intensified target subjects' tendency to find smaller immediate rewards more attractive than larger delayed ones.

## Discussion

Previous studies have shown that adolescents engage in more risky decision making when they are in the presence of peers than when they are alone (Gardner & Steinberg, 2005; Smith et al., 2014), and that this effect on risky decision making may be due to the fact that peers increase adolescents' sensitivity to rewards (Chein et al., 2011; O'Brien et al., 2011; Weigard et al., 2014). The fact that adolescents take more chances and are unduly drawn to immediate rewards when they are in groups poses a potential problem for organizations that place teenagers (and young adults) in situations in which risk taking and reward-driven decision making may be less than optimal. The purpose of the present study was to examine whether the effect of peers on late adolescents' risk taking and reward sensitivity is mitigated by the presence of a slightly older individual. If so, constituting work teams so that they mix adolescents with somewhat older adults may be a useful means for improving judgment and decision making in groups of adolescents.

Our results provide evidence that such a strategy is likely to be effective. Male adolescents took more risks and expressed stronger preference for immediate rewards when they were grouped with 3 same-age, same-sex peers than when they were alone. When just 1 member of the foursome was replaced by someone in his mid- to late 20s, however, adolescents' decision making and reward processing resembled that seen when adolescents were by themselves. In other words, the presence of a slightly older individual eliminated the peer effect that heightens adolescents' risk taking and preference for immediate rewards.

We cannot be certain that the tempering effect of introducing an adult into an adolescent peer group is due specifically to the dampening impact of the adult's presence on adolescents' sensitivity to reward, but given previous studies suggesting that the peer effect on adolescents' risk taking is mediated by an increase in activity in the brain's reward centers (e.g., Chein et al., 2011), and in light of the effect of an adult's presence on reward preference in the present study, this seems to be a plausible interpretation that deserves to be tested through future neuroimaging research. Although risk

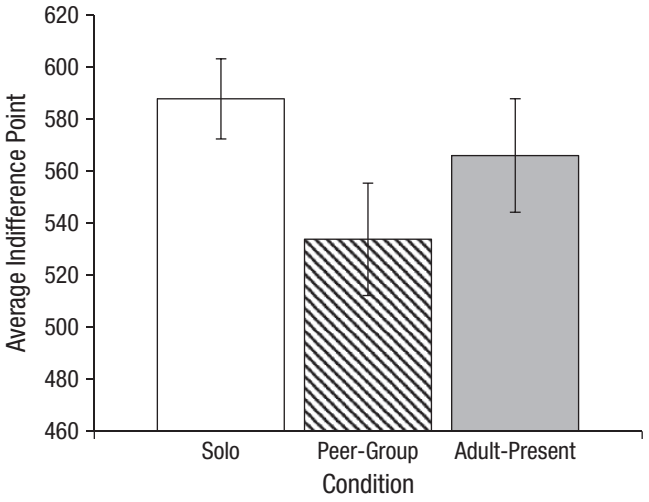


**Fig. 2.** Average indifference points of the target subjects in the three social-context conditions. Error bars represent ±1 *SE*.

taking during the driving task was not correlated with preference for immediate rewards on the delay-discounting task, the latter task is not a measure of reward sensitivity per se, and there is evidence that temporal discounting is influenced by delay of gratification as well as reward processing (Van den Bos, Rodriguez, Schweitzer, & McClure, 2015). What we can conclude confidently is that the observed effect of the adults' presence on the adolescents' risk taking was *not* due to explicit discouragement of risky decision making by the adults, because the adults were confederates who were instructed not to advise the adolescent group members on how to behave. Even in the absence of explicit communication about the dangers of risky choices, of course, late adolescents may employ impression-management strategies in the presence of an older adult, shifting their choices in favor of what they believe reflects more mature

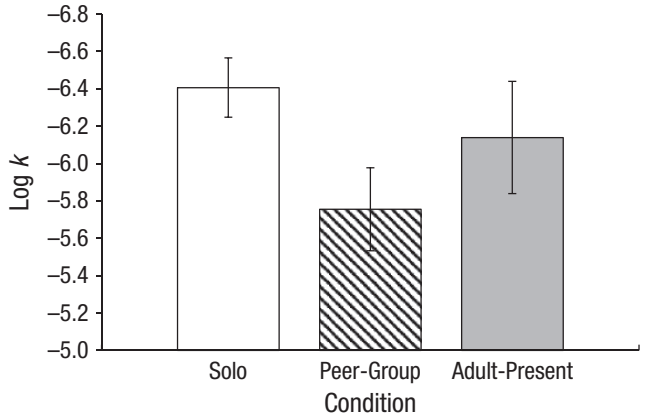


**Fig. 3.** Log-transformed discount rates of the target subjects in the three social-context conditions. Error bars represent ±1 *SE*.

decision making. When choosing between a risky and a safe option, youth may favor the risky choice to express bravado in front of their peers, but favor the safe choice to appear more prudent in front of an adult. However, although it is easy to imagine that a youth's decision about braking at a traffic light may be intended to induce positive impressions in the eyes of his peers, it is not clear why concerns about impression management would influence subjects' preference for immediate rewards, especially when the rewards are hypothetical.

The present study has several significant limitations. One is that it does not address whether the effect that older individuals have on late adolescents' decision making is driven by particular qualities of the adults. Because age and seniority are highly correlated in the military and the workplace, we wanted to construct a scenario in which both factors would be operative. It is therefore unclear whether it was the adults' age, senior status, or demeanor that underlay their effect on the younger individuals in our study. (We attempted to minimize effects of demeanor by instructing confederates to behave in a neutral and nonintrusive fashion.) A second limitation is that our study sample included only males, and the results may not be generalizable to females. A third is that our sample consisted mainly of college students, who may not be typical of young people engaged in roles in other contexts, such as the workplace or military. However, it is likely that most individuals with the potential to carry out important decisions within a team setting are more highly educated than much of the general public, having at least a high school diploma. Finally, we did not systematically vary the extent to which group members had a prior relationship, although we did verify that this did not differ between the peer-group and adult-present conditions. Nonetheless, in most contexts, individuals who are members of work teams come to know each other over time, especially in settings like the military, where teammates live as well as work with each other. We do not know whether the results observed in this study pertain to situations in which all of a group's members are well acquainted.

Despite the fact that 18- to 22-year-olds are legal adults who frequently occupy positions of responsibility in the military and other employment settings, they are still highly susceptible to increases in risk taking in the presence of peers. This fact is consistent with growing evidence that individuals in this age range do not yet evince the mature self-regulatory capacity of individuals in their mid-20s (Steinberg, 2014). Under "cold" conditions, late adolescents often perform comparably to older individuals on various measures of cognitive control (Andrews-Hanna et al., 2011). But under conditions of emotional or social arousal, as often occur when late adolescents are with their peers, they may share certain psychological

characteristics with their somewhat younger counterparts (Cohen et al., in press; Veroude, Jolles, Croiset, & Krabbendam, 2013). Recent studies of brain development suggest that immaturity in self-regulation during this age period, including susceptibility to peer influence, may be linked to still-developing structural and functional connectivity between cortical and subcortical regions (Hwang, Velanova, & Luna, 2010; van Belle, Vink, Durston, & Zandbelt, 2014). Such evidence does not mean that individuals at this age should not be placed in positions of responsibility, but, in combination with our findings, it does suggest that under some conditions, the presence of a slightly older adult may help compensate for adolescents' neurobiological immaturity.

There is no question that late adolescents bring to work teams many desirable qualities, including spontaneity, creativity, and enthusiasm. The key for individuals who supervise people in their late teens and early 20s is to find a way to harness the passion of the young without permitting their readiness to take risks to endanger them and their teammates. If the presence of a slightly older adult coworker diminishes adolescents' myopic tendencies, it is likely that increasing contact between adolescents and adults on the job can improve decision making and deter risky behavior.

## Author Contributions

L. Steinberg and J. Chein developed the study concept. K. Silva oversaw the data collection and performed the data analysis. All authors contributed to interpretation of the data. All authors contributed to writing the manuscript and approved the final version of the manuscript for submission.

## Acknowledgments

We gratefully acknowledge the assistance of Salena Binnig, Sara Cote, Veronica Gould, and Kristen Kiesow in collecting the data.

## Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

## Funding

This work was funded by a grant to L. Steinberg and J. Chein from the U.S. Army Medical Research and Materiel Command (W81XWH-12-2-0124).

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