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**Master's Thesis Clinical Child and Adolescent Psychology**

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**Sex, friends and impulses: The effects of peer norms and impulsivity on  
sexual risk behaviors**

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## **Abstract**

Sexual Risk Behaviors (SRB) among adolescents can have far-reaching negative outcomes. Research have shown that two types of peer norms (descriptive and injunctive peer norms) and impulsivity both have a strong association with SRB. This study primly examines: 1) The association between (descriptive and injunctive) peer norms and SRB; 2) The association between impulsivity and SRB; 3) Whether the association between descriptive and injunctive peer norms and SRB is moderated by impulsivity and age. Data from 2 waves from a longitudinal study of 1044 Dutch adolescents in secondary school ( $M_{age}=14.2$ ), were used. Multiple regression analysis revealed that 1) high descriptive norms predicted low SRB; 2) Impulsivity did not predict SRB; 3) Impulsivity and age moderated the association between peer norms (descriptive and injunctive) and SRB. The results indicated that new interventions focused on reducing SRB should consider the effects of descriptive and injunctive peer norms and impulsivity on SRB.

*Keywords:* adolescents, sexual risk behaviors, peer norms, impulsivity, longitudinal.

Sexual risk behaviors (SRB) among adolescents, such as unprotected sex, substance use during sexual acts, and multiple sexual partners, can have far-reaching negative outcomes (Miller et al., 2004; Shneyderman & Schwartz, 2012). Teen pregnancies remain high world-wide (Sedgh et al., 2015) despite improvement of contraception and prevention programs (Bearinger et al., 2007; Goesling et al., 2014; Lindberg et al., 2016). In the Netherlands, the number of Sexually Transmitted Infections (STIs) increases almost every year (Slurink et al., 2019). In 2018, 23% of new cases diagnosed with Chlamydia were people under the age of 20 (Slurink et al., 2019). This stresses the urgent need to further examine SRB during adolescence, and identify important risk factors to promote behavioral change and adolescents' healthy sexual behaviors. Adolescents are prone to engage in sexual behaviors when they perceive those behaviors as common among their peers (Van de Bongardt et al., 2015). It has been shown that the development of adolescents' sexual behaviors is an outcome of social factors and individual characteristics (Reitz et al., 2015). This study focuses on two factors that have received considerable attention when it comes to risk-taking during adolescence: peer norms and individual differences in impulsivity; it extends this research by investigating how they interact in predicting sexual risk-taking.

### **Injunctive and descriptive peer norms**

Peers has shown to be a major factor in adolescents' sexual development (Van de Bongardt et al., 2015). Two dominant social-psychological theories propose mechanisms that may underlie peer effects on adolescents' sexual behaviors. First, the Social Learning Theory suggests that behaviors develop in a social context, and are instrumental in obtaining social benefits (Bandura, 1973; Heilbron & Prinstein, 2008). Adolescents might be motivated to conform to behavioral norms because they expect social acceptance, or increase in social status (Heilbron & Prinstein, 2008).

Second, the Social Norm Theory posits that people tend to adapt their own behavior in concordance with their perception of behaviors that are accepted or desirable among their peers (Cialdini & Trost, 1998). This theory distinguishes between two types of social norms to account for similarities in behaviors. The first, *descriptive* norms, is conceptualized as perceived behaviors of

peers; The second, *injunctive* norms, is conceptualized as perceived attitudes (i.e., approval or disapproval) of peers, regarding engagement in certain behaviors (Cialdini & Trost, 1998).

The effects of *injunctive* and *descriptive* peer norms were demonstrated in a meta-analysis combining the effects of 20 studies by van de Bongardt and colleagues (2015), that examined the association between peer norms, and being sexually active and SRB. With respect to *descriptive* norms, adolescents who perceived their peers as more sexually active were more sexually active themselves (Van de Bongardt et al., 2015). This can suggest that adolescents would be more prone to engage in sexual behaviors when they perceive those behaviors as common among their peers (Trinh et al., 2019; Nogueira Avelar e Silva, 2020). Similarly, adolescents who believed that their peers engage in more *risky* sexual behaviors, were more likely to engage in such behaviors themselves (Van de Bongardt et al., 2015). The effect of descriptive norms differs by age and depends on the type of sexual behavior examined - the association between peer sexual activity and *being sexually active* was found to be stronger for older adolescents, while the association between descriptive norms and *risky sexual behaviors* was stronger for younger adolescents (Van de Bongardt et al., 2015).

Regarding *injunctive* norms, result of the meta-analysis by Van de Bongardt and colleagues (2015) found that adolescents who perceived their peers as more accepting of sexual behaviors, tended to be more sexually active themselves. There were too few studies to meta-analyze the association between injunctive norms and *risky sexual behavior*, although some studies have found a relationship. For example, sexual permissiveness of peers was associated with a higher frequency of SRB (Potard et al., 2009). Descriptive and injunctive peer norms both predicted adolescents' engagement in risky online sexual behavior (Baumgartner et al., 2011). Furthermore, peer approval of online risky behaviors, was found to be associate with increase in online risky actions (Sasson & Mesch, 2014) and sexting (Van Ouytsel et al., 2017). The association between injunctive norms and adolescent sexual activity increased with age; however, as mentioned, the link with *risky* sexual behaviors was not assessed (Van de Bongardt et al., 2015). The effects of *injunctive* norms were also found on other adolescent risky behaviors, such as alcohol use (Lac & Donaldson, 2020), risky driving (Simons-Morton et al., 2014), and delinquency (Slagt et al., 2015). Therefore, it is important to further investigate the association between *injunctive* norms and adolescent SRB.

The above-mentioned findings provided only a limited insight on risky sexual behavior among adolescents. The first purpose of this study is to contribute to literature by looking at the limitations of past research regarding the association between peer norms and SRB. The age differences between the effect of *injunctive* and *descriptive* peer norms also needs to be further examined, as studies have indicated inconsistent results. Although it has been suggested that older adolescents are more resistant to peer influence (Sumter et al., 2009), the association between peer norms and being sexually active, was found to increase with age (Van de Bongardt et al., 2015). Additionally, information is lacking regarding the effects of *injunctive* norms on adolescent SRB (Van de Bongardt et al., 2015).

### **Impulsivity**

Studies that examined associations between peer norms and adolescent risk behavior, have shown that the latter can also be attributed to personality characteristics. Personality has also been found to impact on the degree to which peer norms are associated with risk behavior (Pocuca et al., 2018; Vitulano et al., 2009). Substance-use research have shown that impulsivity-related traits moderated the association between perceived peer alcohol use and high adolescents' alcohol use (Stautz & Cooper, 2014). These results may indicate that it would be beneficial to further research impulsivity in connection with peer norms and adolescents' SRB, which may clarify the discrepancy in literature above.

The ecological theory by Bronfenbrenner (1979), posits that adolescents' behaviors are consequences of continuous interactions between individual characteristics and social factors such as peers. Such theories encourage the use of personality dimensions as well as social factors in the research of human behaviors. The few studies that have tested the association between personality characteristics and SRB have focused on impulsivity. Impulsivity refers to "behavior that is performed with little or inadequate forethought (Evenden, 1999)." Adolescents were found to be less capable of delaying gratification, or learn from negative consequences (Reyna & Farley, 2006). Adolescents who were more impulsive, reported on a larger variety of sexual behaviors (Reitz et al., 2015). A meta-analytic review has indicated that impulsivity is associated with SRB among

adolescents, since they often explore sexual behaviors, and have increased peer influences on their behaviors (Dir et al., 2014). Higher impulsivity was found to be linked with various SRB, such as an earlier age of sexual intercourse, a higher number of sexual partners, and unprotected sex (De Daas et al., 2014; Dir et al., 2014; Donohew et al., 2000; Hoyle et al., 2000; Kahn et al., 2002; Mori et al., 2021).

Research focusing on impulsivity show that older adolescents exhibited higher levels of sexual sensation-seeking, whereas younger adolescents were more impulsive and showed higher rates of STIs (Sales et al., 2011). This intriguing gap is also supported by neurological studies which have shown that younger adolescents are more impulsive (Steinberg, 2010; Steinberg et al., 2008). Therefore, the second purpose of this research is to further investigate the association between impulsivity and SRB, and the effect of age on this association.

Finally, studies have shown that the association between peer norms and adolescents' other risky behaviors varies depending on the level of impulsivity (Pocuca et al., 2018; Vitulano et al., 2009). Specifically, for adolescents with high levels of impulsivity, high perceived peer alcohol use was associated with high adolescents' alcohol use (Stautz & Cooper, 2014). With respect to sexual behavior, to our knowledge, only one study tested whether the link between self-regulation (including impulsivity) and SRB was moderated by peer pressure (Raffaelli & Crockett, 2003). While it was shown that impulsivity and peer pressure positively affect SRB, peer pressure was not found to enhance the association between impulsivity and SRB (Raffaelli & Crockett, 2003). However, neither a clean measure of impulsivity was included nor were other types of peer effects were examined. Thus, the third aim of this study is to examine whether impulsivity can moderate the connection between peer norms and SRB.

### **Current study**

This study draws from a longitudinal study of Dutch adolescents to examine the following: The first aim of this study is to investigate whether peer norms (descriptive and injunctive) predict SRB of adolescents one year later (with prior levels of SRB controlled), and whether this association

varies by adolescent age. Based on the literature reviewed, it is hypothesized that (1a) peer norms positively predict SRB and this association is (1b) stronger for younger adolescents compared to older adolescents. The second aim of this study is to investigate whether impulsivity predicts SRB of adolescents one year later (with prior levels of SRB controlled), and whether this association also varies by adolescent age. Based on the literature reviewed, it is hypothesized that (2a) impulsivity positively predict SRB, and this association is (2b) stronger for younger adolescents compared to older adolescents. The third aim of this study is to investigate whether impulsivity moderates the association peer norms and SRB of adolescents, and whether this association varies by adolescent age. Based on the literature reviewed, it is hypothesized that (3a) high impulsivity will moderate a positive association between peer norms and SRB, and (3b) high impulsivity and low age will moderate a positive association between peer norms and SRB.

## **Method**

### **Participants**

Data for the present study were collected as part of Project STARS (Studies on Trajectories of Adolescent Relationships and Sexuality), a longitudinal study on adolescent sexual development, conducted in the Netherlands between 2010-2015 (Reitz et al., 2015). In the current study, we have included only adolescents who were attending secondary school, as the questionnaire for the elementary school did not include SRB. Therefore, data were collected among a sample of 1,044 12- to-19-year-old adolescents, at 4 measurements times (T1 = Fall 2011, T2 = Spring 2012, T3 = Fall 2012, T4 = Spring 2013). For this study, we used data from waves T2 and T4. In wave T2, 49% of participants were females, 92% were Dutch, and 13% have had sexual experience.

### **Procedure**

Participants were recruited from four secondary schools in the Netherlands. Adolescents and their parents received letters, describing the aims of the study. Passive informed consent forms were distributed, where parents could indicate if they do not want their child to participate in the study.

Researchers supervised the data collection, which included online questionnaires for adolescents to reply in the classroom voluntarily. Confidentiality of the responses and the option to withdraw participation at any time were guaranteed. After participation, adolescents received a gift certificate (€5,00 at T1 increasing €12,50 at T4). Project STARS was approved by Utrecht University ethics board.

## **Measures**

### ***Risky sexual behavior***

The level of SRB at T2 and T4 was assessed separately with two 2-item subscales regarding (1) <sup>1</sup>*non-use of contraception* and (2) <sup>2</sup>*substance use during sexual acts*. The items that adolescents were presented regarding non-use of contraception were “When I have sex, I use condoms to prevent STD’s” and “when I have sex, I use contraception to prevent pregnancy” (on 5-point Likert-scale 0=*never*, 5=*very often*). Scores were reversed coded so that a higher score indicated higher SRB.

Reliability using Cronbach’s alpha not sufficient, at T2  $\alpha = .03$ , and moderate at T4  $\alpha = .60$ .

In addition, the items that adolescents were presented with regarding substance use during sexual acts were “have you ever had sex under the influence of alcohol?”, “have you ever had sex under the influence of drugs?” (on 5-point Likert-scale 0=*never*, 5=*always*). Reliability using Cronbach’s alpha was quite good, at T2  $\alpha = .714$  and at T4  $\alpha = .719$ .

### ***Sexual-risk peer norms***

To measure *descriptive* norms, adolescents’ perceptions of their friends’ SRB were assessed at T2, with the following items: “How many of your best friends always use birth control (e.g., birth control pills or a condom) to prevent pregnancy when having sex have with someone?”; “How many of your best friends always use a condom to prevent STIs?” (on a 6-point Likert-scale 1=*none of my*

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<sup>1</sup> Non-use of contraceptives in this study refers to non-use of condoms and contraceptive pills in order to prevent pregnancy and STI’s.

<sup>2</sup> Substance use in this study refers to alcohols and drugs use.

*friends*, 6=*all of my friends*). Lower scores indicated that adolescents perceived *more* friends as involved in more SRB. Reliability using Cronbach's alpha was quite good, at T2  $\alpha = .959$ .

To measure *injunctive* norms, adolescents' perceptions of their friends' (dis)approval toward sex were assessed at T2 with one item (Dittus & Jaccard, 2000): "My best friends think boys and girls our age should only have sex have when they are in a relationship." (on a 6-point Likert-scale where 1=*none of my friends*, and 6=*all of my friends*). Scores were reversed so that a higher score indicated that adolescents perceived their friends as more approving of casual risky sex.

### ***Impulsivity***

*Impulsivity* was measured with part of the Eysenck Impulsiveness Scale (Vitaro et al., 1997). Adolescents reported on three items: "Mostly I do or say things without thinking about it"; "I regularly get into trouble because I do things without thinking"; "I'm an impulsive person" (on a 5-point Likert-scale from 1=*completely disagree* to 5=*completely agree*). Higher scores indicated higher levels of impulsivity. Reliability using Cronbach's alpha was quite good, at T2  $\alpha = .861$ .

### **Statistical analysis**

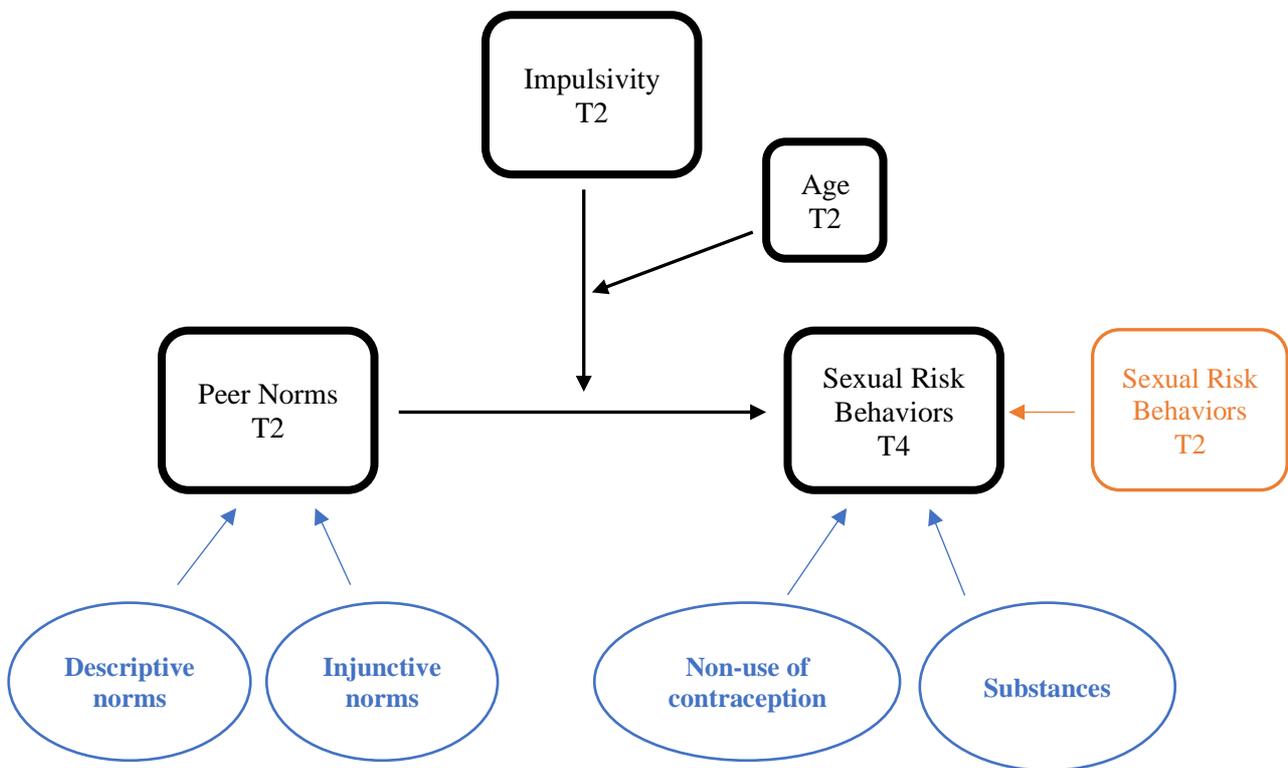
Descriptive statistics of all research variables, and regression analysis, were analyzed using SPSS version 26 (IBM Corp. Released, 2019).

In order to test our hypotheses, a multiple-regression analysis was performed using PROCESS macro for SPSS model 3 (version 3.5; Hayes, 2017). This model offers an analysis of three-way moderation, two-way moderations and main effects. Therefore, this multiple-regression analysis was used to assess all three hypotheses concurrently, for each coupling of predictor and outcome variable. As there are two variables that constitute peer norms as the predictors (*descriptive* and *injunctive* norms at wave T2), and two variables that constitute SRB as an outcome variable (non-use of contraception and substance use during sexual acts, at wave T4), *four* multiple regression analyses were performed. To each regression model we entered one outcome variable, one predictor, two moderators (impulsivity and age at wave T2), and a covariate (SRB at wave T2, respectively with the outcome variable; see *Figure 1*). Predictors were centered prior to the analysis. Significant

interactions were followed by estimation of the predictor’s effect on the outcome variable at the mean, plus 1 SD and minus 1 SD, using Johnson-Neyman technique. All tests performed with  $\alpha$  set at .05. In addition, prior to the analysis, regression assumptions were tested. The assumption of normal distribution was violated; however, regression analysis by PROCESS macro is robust for this violation (Preacher et al., 2007). Also, one outlier was found for substance use during sexual acts, and excluded from the analysis. Finally, the assumptions of homoscedasticity, homogeneity, multicollinearity and linearity between the dependent and independent variables were met.

**Figure 1**

*Description of analysis models*



*Note: T2= wave 2, T4= wave 4*

## Results

### Descriptive statistics

Eligible data collected at the study differed according to every variable, as not all participants replied for every item. Table 1 presents descriptive statistics and correlations of research variables. Results indicated that substance use during sexual acts at T2 and T4 were moderately significantly correlated. There was also a significant low correlation between non-use of contraception at T2 and T4. In addition, there was a low significant correlation between impulsivity at T2 and substance use during sexual acts at T2, and between age at T2 and impulsivity, *descriptive norms* and *injunctive norms* at T2.

**Table 1**

*Correlations, means, and standard deviations of all variables before centering*

	1	2	3	4	5	6	7	8	<i>n</i>	<i>M</i>	<i>SD</i>
1. Substance use during sex T2	-								106	1.45	.74
2. Substance use during sex T4	.70**	-							138	1.44	.76
3. Non-use of contraception T2	-.04	-.07	-						92	1.68	.90
4. Non-use of contraception T4	.19	.29**	.45**	-					106	1.73	1.06
5. Age T2	.11	.15	-.13	-.18	-				962	14.49	1.15
6. Impulsivity T2	.25**	.04	.007	-.04	.12**	-			912	2.64	1.01
7. Sexual-risk descriptive norms T2	.05	.01	-.17	-.11	.54**	.22**	-		501	2.44	1.84
8. Sexual-risk injunctive norms T2	-.05	.006	-.07	-.19	.09**	-.05	-.03	-	924	2.88	1.70

\* $p < .05$ , \*\*  $p < .001$

### Drop out bias

In order to measure the drop off bias of the study, an independent-samples t-test and chi-square test of independence were conducted to compare the research variables in two levels of sexual

experience of participants- (1) participants of T2 and T4, and (2) participants of T2 only (indicating participants who dropped-out). The results indicated that compared to adolescents who were present at T2 and T4, those adolescents who dropped-out at T4 were older ( $M_{present\ T2\ and\ T4} = 14.14, SD=1.21; M_{present\ T2} = 15.28, SD=1.34; t(704) = -3.08, p=.002$ ), showed higher levels of peer *descriptive* norms ( $M_{present\ T2\ and\ T4} = 2.03, SD=1.66; M_{present\ T2} = 2.14, SD=1.95; t(377) = -3.08, p=.002$ ), and showed higher levels of impulsivity ( $M_{present\ T2\ and\ T4} = 5.56, SD=.97; M_{present\ T2} = 3.36, SD=1.03; t(672) = -2.72, p=.007$ )

### **Peer norms, impulsivity, and sexual risk behaviors**

Table 2 presents the results of *four* multiple regression analyses, which shows main effects, two-way moderations and three-way moderation, according to two peer norms (*descriptive* and *injunctive* norms), and according to the two outcome variables (non-use of contraception and substance use during sexual acts).

**Table 2***Multiple regression analyses*

	<b>Non-use of contraception (T4)</b>			<b>Substance use during sex (T4)</b>		
Model 1 (Descriptive norms)	n=39, $F(8,30)=1.8$ , $R^2=.33$ , $p=.12$			n=55, $F(8,46)=$ , $R^2=.66$ , $p=.000$		
	<i>B</i>	<i>SE</i>	<i>t-value</i>	<i>B</i>	<i>SE</i>	<i>t-value</i>
Covariate (T2)	.27*	.21	2.19	.83**	.10	7.94
Age (T2)	.15	.09	1.68	.01	.07	.17
Impulsivity (T2)	-.14	.12	-1.14	-.09	.08	-1.11
Descriptive norms (T2)	-.06	.08	-.83	.11*	.05	2.2
Descriptive norms x age	-.01	.06	-.23	-.02	.04	-.53
Impulsivity x age	.04	.12	.41	.04	.07	.50
Descriptive norm x impulsivity	-.03	.07	-.42	-.06	.05	-1.27
Descriptive norm x impulsivity x age	-.09	.06	-1.49	.12*	.05	2.33
Model 2 (Injunctive norms)	n=48, $F(8,39)=2.37$ , $R^2=.33$ , $p=.035$			n=70, $F(6,61)=5.51$ , $R^2=.42$ , $p=.000$		
	<i>B</i>	<i>SE</i>	<i>t-value</i>	<i>B</i>	<i>SE</i>	<i>t-value</i>
Covariate (T2)	.32*	.12	2.54	.74**	.12	5.95
Age (T2)	.11	.09	1.17	-.09	.07	-1.39
Impulsivity (T2)	-.08	.14	-.55	-.06	.10	-.65
Injunctive norms (T2)	-.03	.07	-.42	-.06	.05	-1.15
Injunctive norms x age	.08	.05	1.6	.003	.04	.08
Impulsivity x age	.16	.10	1.54	.05	.08	.00
Injunctive norms x impulsivity	.18*	.08	2.1	.09	.06	1.66
Injunctive norms x impulsivity x age	.10	.07	1.62	.02	.05	.49

*(B) Unstandardized regression coefficients, (SE) Standard errors*\* $p<.05$ , \*\* $p<.001$

## Summary of findings

### *Non-use of contraception*

**Hypothesis 1: (a) peer norms (descriptive and injunctive) positively predict SRB, (b) stronger association for younger adolescents compared to older adolescents.** (a) No association was found between and non-use of contraceptives T4 and peer norms (*descriptive* and *injunctive*) T2. (b) Also, when age T2 was added as a moderator, no association was found.

**Hypothesis 2: (a) Impulsivity positively predicts SRB, (b) stronger for association younger adolescents compared to older adolescents.** (a) No association was found between impulsivity T2 and non-use of contraception T4. (b) Also, when age T2 was added as a moderator, no association was found.

**Hypothesis 3: (a) high impulsivity will moderate a positive association between peer norms and SRB, (b) high impulsivity and low age will moderate a positive association between peer norms and SRB.** (a) A two-way interaction was found which indicated that impulsivity T2 is moderating the positive association between *injunctive* peer norms and at T2 and non-use of contraception T4 ( $B = .18, t(39)=2.11, p=.04$ ). Follow-up Johnson-Neyman analysis indicated that: for adolescents with low levels of impulsivity, the association between *injunctive*-norm and non-use of contraception was marginally-significant ( $B=-.20, p=.06$ ) while for adolescents with moderate and high levels of impulsivity, the association between *injunctive* norm and non-use of contraception was non-significant ( $B_{moderate\ impulsivity} = -.03, p=.68; B_{high\ impulsivity} = .14, p=.22$ ). No two-way interaction was found between impulsivity T2 and *descriptive* norms T2 and non-use of contraception T4. (b) The three-way interaction between age, impulsivity and either peer norm was not found. Thus, age did not moderate the two-way interaction that was found.

### *Substance use during sexual acts*

**Hypothesis 1: (a) peer norms (descriptive and injunctive) positively predict SRB, (b) stronger association for younger adolescents compared to older adolescents.** (a) High *Descriptive* peer norms T2 were found to predict low substance use during sexual acts at T4 (As low values of

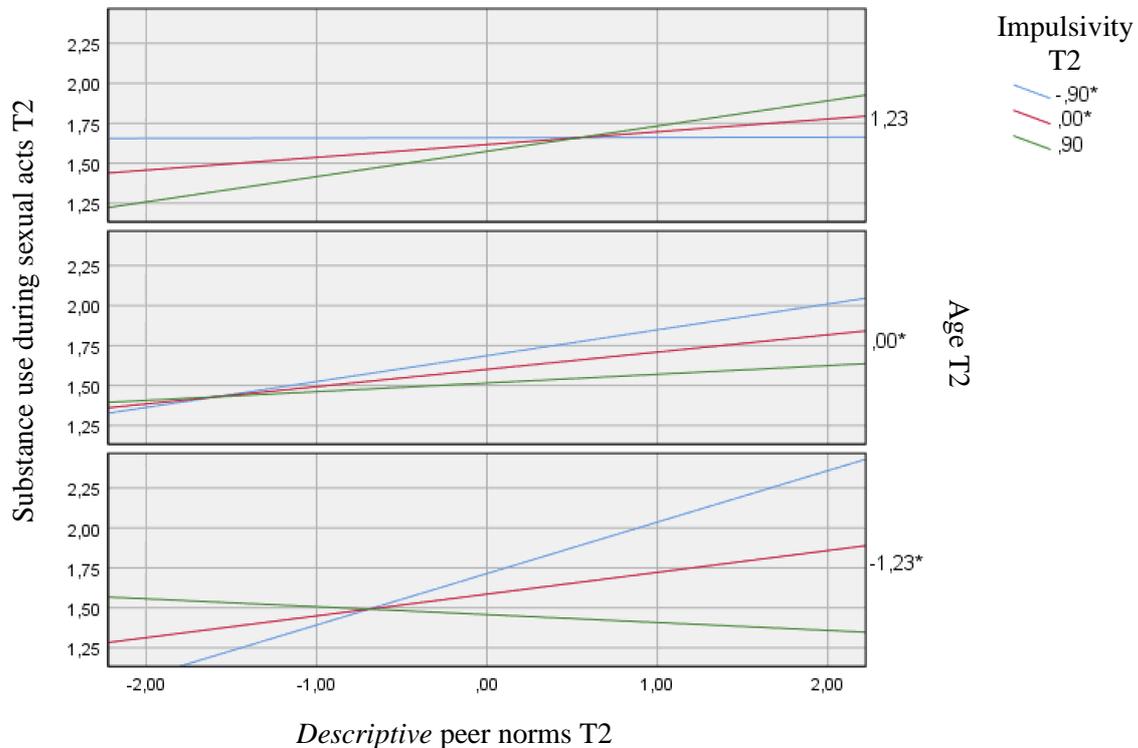
*descriptive* norms indicate high levels of perceived sexual risk experiences of peers;  $B=.11$ ,  $t(46)=2.21$ ,  $p=.03$ ). No association with *injunctive* peer norms T2. (b) These associations were not moderated by age T2.

**Hypothesis 2: (a) Impulsivity positively predicts SRB, (b) stronger for association younger adolescents compared to older adolescents.** (a) No association was found between impulsivity T2 and substance use during sexual acts T4. (b) Also, when age T2 was added as a moderator, no association was found.

**Hypothesis 3: (a) high impulsivity will moderate a positive association between peer norms and SRB, (b) high impulsivity and low age will moderate a positive association between peer norms and SRB.** (a) No two-way interactions were found between substance use during sexual acts T4, impulsivity T2 and *descriptive/injunctive* peer norms T2. (b) However, a three-way interaction was found and indicated that higher rates of *descriptive* norms T2 predict lower adolescents' SRB T4, and this association was moderated by impulsivity T2 and age T2 ( $B=.12$ ,  $t(46)=2.55$ ,  $p=.01$ ). Follow-up Johnson-Neyman analysis indicated that: For young adolescents with low and moderate levels of impulsivity, the association between descriptive norms and substance use during sexual acts was significant ( $B=.32$ ,  $p=.006$ ;  $B=.14$ ,  $p=.04$ , for low and moderate levels of impulsivity, respectively), for high levels of impulsivity it was not significant ( $B=-.05$ ,  $p=.48$ ). For middle adolescents with low and moderate levels of impulsivity, the association between descriptive norms and substance use during sexual acts was significant ( $B=.16$ ,  $p=.01$ ;  $B=.11$ ,  $p=.03$ , for low and moderate levels of impulsivity, respectively), for high levels of impulsivity it was not significant ( $B=.05$ ,  $p=.47$ ). For older adolescents regardless of impulsivity, the association between descriptive norms and substance use during sexual acts was non-significant ( $B=.001$ ,  $p=.98$ ;  $B=.08$ ,  $p=.30$ ;  $B=.16$ ,  $p=.18$ , for low and moderate and high levels of impulsivity, respectively). These results are illustrated in *Figure 2*. The three-way interaction between age, impulsivity and *injunctive* peer norm was not found.

**Figure 2**

*Johnson-Neyman regression slopes for three-way moderation between, age, impulsivity, descriptive norms and use of substances during sexual acts.*



## Discussion

Given the constant rise in adolescent SRB, and therefore increase in teen-pregnancies and STI's (Sedgh et al., 2015; Slurink et al., 2019), the current study aimed at investigating if impulsivity, peer norms and age, predict adolescent SRB. We examined the longitudinal association between peer norms (T2) and SRB (T4), and explored whether this association is moderated by impulsivity and age (T2). In order to assess these associations, we have looked at two SRB – non-use of contraception and substance use during sexual acts, as well as two forms of sexual-risk-peer-norms – *descriptive* and *injunctive* norms.

## Main findings

### *Non-use of contraception*

According to our findings, perceived sexual risk attitudes or experiences of friends, do not predict adolescents' use of condoms and contraceptive pills. Additionally, individual level of impulsivity does not predict non-use of contraception. These associations are also not moderated by age. These findings reject our first and second hypotheses.

However, a two-way-interaction was found, indicating that for higher levels of adolescents' impulsivity, high perceived peer-approval of sexual risk predicts adolescents' high non-use of contraception. Although further exploration of different levels of impulsivity on the results are non-significant, they suggest a tendency – for *higher* levels of impulsivity, high perceived peer-approval of sexual risk indicates high adolescents' non-use of contraception, and for *lower* levels of impulsivity, high perceived peer-approval of sexual risk indicates low adolescents' non-use of contraception. No two-way-interaction was found either for *descriptive* norms and impulsivity, nor for three-way-interactions for either peer norm, impulsivity and age. This partially confirms our third hypothesis.

### ***Substance use during sexual acts***

According to our findings, adolescents who perceived their friends as taking more sexual risks are less likely to use substances during their sexual acts in the following year. This indicate that the association has an opposing direction than our first hypothesis. However, no association was found between substance use during sexual acts and *injunctive* norms, and the associations are not moderated by age. Additionally, no association was found between impulsivity and use of substances during sexual acts, which rejects our second hypothesis.

However, a three-way-interaction was found, indicating that for higher levels of adolescents' impulsivity and older ages, high levels of perceived friends' sexual risk predict adolescents' low substance use during sexual acts. Although further examination of different levels of impulsivity and age on the results are partially significant, they indicate a trend – for *higher* levels of impulsivity and age, high perceived sexual risk experiences of friends indicate high adolescents' substance use during sexual acts, and for *lower* levels of impulsivity and age, high perceived sexual risk experiences of friends indicate low adolescents' substance use during sexual acts. No three-way-interaction was

found between *injunctive* norms, impulsivity and age, nor a two-way-interactions of either peer norm and impulsivity. This partially confirms our third hypothesis.

### **Interpretation of main findings**

The main findings of this study suggest that impulsivity (and age) moderate the association between sexual risk peer norms and adolescent's own SRB. This is in line with the ecological theory by Bronfenbrenner (1979) which posits that behaviors are consequences of interaction between individual characteristics and social factors.

The first found moderation suggests that for higher levels of adolescents' impulsivity, high perceived peer-approval of sexual risk (*injunctive* norms) predicts adolescents' high non-use of condoms and contraceptive pills. This association is supported by previous findings. First, higher impulsivity was found to associate with SRB (Dir et al., 2014; Reitz et al., 2015). Second, it has been shown that adolescents who perceived their peers as more approving of sexual behaviors, tended to be more sexually active themselves (Van de Bongardt et al., 2015). Third, impulsivity was found to enhance the natural tendencies to conform with friends in order to receive social benefits (Heilbron & Prinstein, 2008; Romer & Hennessy, 2007).

When age was added to this examined moderation (three-way interaction), an interaction was not found. A possible explanation for this can be seen in a meta-analysis which concluded that the association between age and sexual behaviors have low effect sizes (Van de Bongardt et al., 2015), which could not be replicated in this study due to low number of sexually-active participants.

The second found moderation indicate that for lower levels of adolescents' impulsivity and younger age, high levels of perceived friends' sexual risk experiences (*descriptive* norms) predict adolescents' low substance use during sexual acts. This contradicts prior research which showed that high *descriptive* peer norms are associated with high adolescent SRB (Trinh et al., 2019; Van de Bongardt et al., 2015), and that higher impulsivity is associated with younger ages (Steinberg et al., 2008). This discrepancy can have three possible explanations. First, this can be a result of the measurement of *descriptive* norms in this study. While we measured the perceived SRB of 'best friends', it has been shown that adolescents' SRB are more strongly associated with perceived risky

sex of more *distant* peers (Van de Bongardt et al., 2015). Second, for perceived behaviors of ‘best friends’, adolescents may learn from the ‘negative rewards’ that their friends receive, and their friends’ mistakes, in this case - less substance use during sexual acts. This explanation sees support in the Social Learning Theory which posits that learning occur through ‘modeling’ – learning through the influence of examples, especially when mistakes can be dangerous (Bandura, 1971). Third, as younger adolescents are usually more impulsive and show higher SRB (Sales et al., 2011), it is possible that younger adolescents who have *lower* levels of impulsivity show lower SRB.

According to our findings, a different type of peer norm affects a different type of SRB: Perceived SRB of friends (*descriptive* norms) predict adolescents’ substances use during sexual acts, while perceived sexual-risk-attitudes of friends (*injunctive* norms) predict adolescents’ non-use of condoms and contraceptive pills (association is moderated by impulsivity). Regarding *descriptive* norms, this finding is supported in previous studies, as *descriptive* norms were found to be associated with alcohol and substance consumption, and not *injunctive* norms (Sönmez Güngör et al., 2021). As for *injunctive* norms, adolescents’ behavior in this study may be influenced from their tendency to perceive their friends as opposing to sexual intercourse without contraception. This may be the result of exposure to explicit available information, which was found to be associated with constructing sexual attitudes (Koletić, 2017). In the Dutch education system, there is a particular emphasis on the use of contraception in order to reduce rates of teen-pregnancies and STI’s (Van de Bongardt et al., 2013; Weaver et al., 2005), which can account for this association. However, further investigation is needed to better understand these associations.

Although our hypotheses regarding the main associations between SRB and *injunctive* peer norms, and SRB and impulsivity were not found, these associations are qualified by the above-mentioned two-way and three-way interactions.

These findings suggest that impulsivity and different peer norms affect different SBR. Within the aim to reduce adolescent’ SRB, policy makers and new interventions developers should consider these factors in providing a more efficient approach.

## **Strengths**

The current study had several strengths. First, we used longitudinal data, which allowed us to assess the associations between adolescents' SRB controlling for prior levels of sexual risk behavior, we were able to assess the predictive effect. Second, measuring multiple SRB allowed us to assess the specific role of peers in various SRB in adolescence, rather of only one kind of sexual risk. Finally, as far as we know, this is the first study to analyze whether impulsivity moderates the association between peer norms and SRB.

### **Limitations and future studies**

Some limitations for this study need to be considered as well. First, the generalizability of the results to other ethnic groups may be limited most participants have a Dutch background. Second, the data were collected from adolescents' self-reports, which may have led to bias, as boys often over-report their sexual experiences, while girls often under-report them (Siegel et al., 1998). Third, participants in our study report low rates of sexual experience and low rates of SRB, therefore the assessment models include low number of participants. Fourth, the drop out bias suggests that participants who did not pressure to T4 have shown higher *descriptive* norms and impulsivity.

Future studies should include larger analysis sample which could allow more generalizability by adding different ethnicities, and higher levels of SRB. Additionally, to avoid self-report bias, future studies can use an additional type of measurement, such as a behavioral measure of SRB, or cross reports with participants' sexual-partners. Finally, future research should investigate the differences between genders in the moderation of impulsivity of the association between peer norms and SRB, as it has been shown that girls have a greater effect of impulsivity on SRB (Dir et al., 2014). This could not have been assessed in this study due to low SRB and low sample size.

### **Conclusions**

The results of this study provide new insight into adolescents' sexual risk behaviors. This study extends current literature as the first research to recognize the moderating effect of impulsivity on the association between sexual-risk-peer-norms and sexual risk behaviors of adolescents. In particular, this study shows that perceived peer attitudes predict non-use of condoms and

contraceptive pills, and perceived peer behaviors predict substance use during sexual acts; these associations are moderated by levels of impulsivity. These findings have positive implications for the development of new prevention programs and intervention strategies to reduce adolescent sexual risk-taking. These interventions should particularly consider the role of impulsivity in the effects that peers have on individual behavior.

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