The Effect of Attachment and Divorce on Substance Use in Adulthood

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Abstract

There is a large research pool around the risk factors of substance use (SU), but the relationships of secure attachment (SA) and insecure attachment (IA) and divorce on substance use have not been explored thoroughly. This study aims to investigate said relationship as well as possible interaction effects of divorce and parental attachment on substance use. The sample ($N = 241$) consists of 186 women and 55 men ($M_{age} = 24.46, SD_{age} = 9.559$). Participants were asked to fill the Adult Scale of Parental Attachment – Short Form (ASPA-SF), the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST), indicate their parental marital status when they were children, and demographic data. A negative correlation between SA and SU, a positive relation between IA and SU, and a positive correlation between divorce and SU was expected. Divorce was expected to interact with SA and IA and strengthen the relationship with SU. Participants with divorced parents were expected to have higher scores on SU than participants whose parents were not divorced, whether they have an insecure or secure attachment style. The hypotheses were tested with a hierarchical multiple regression. Insecure attachment significantly predicted higher scores on SU, but the effect of secure attachment on SU was not significant. The effect of divorce on SU was not significant, neither was the interaction effect between secure attachment and divorce. The interaction effect between insecure attachment and divorce was found to be significant. Different maladaptive and adaptive attachment styles were not considered separately, which future research might consider.

Keywords: attachment style, insecure attachment, secure attachment, substance use, divorce, ASSIST, ASPA-SF

The Effect of Attachment and Divorce on Substance Use in Adulthood

The parent-child relationship is an excellent example of an interplay of genes or nature and environment or nurture, where the parents' genes refer to the nature aspect, does the physical environment around the child refer to the nurture aspect (e.g., socioeconomic status). This relationship has gained major attention in psychology especially since Bowlby's formulation of the attachment theory. Bowlby defines being attached as an attribute of a child seeking closeness to their attachment figure especially when distressed (1969). Attachment itself is defined as "a bond, tie, or enduring relationship between a young child and his mother" (Ainsworth et al., 2015, first ed. 1978).

This study aims to explore whether attachment style can predict substance use in adulthood moderated by parental divorce in childhood. Gender and age will be included as a covariate if needed. It is expected that males and younger participants have a higher risk of substance use. For this, people will be asked to fill out a questionnaire that inspects their parental attachment pattern retrospectively and one that assesses their risk of substance use.

With the Strange Situation, Ainsworth et al. (2015, first ed. 1978) measure the attachment pattern of infants to their mothers, by the reaction of the infants when the attachment figure leaves the room and returns to comfort them. The attachment styles Ainsworth et al. (2015, first ed. 1978) and Main and Solomon (1986, 1990) found are the following:

Secure attachment: With their mother in the room infants were exploring and even leaving the secure base. These infants are unlikely to get upset when their mother leaves them.

Anxious attachment: Anxiously attached infants are more likely to cry than other babies, they also have a higher likelihood to display separation anxiety. These infants lack the trust in their attachment figure to always be available and in proximity.

Avoidant attachment: Anxiously attached infants show frequent separation anxiety but cry very little in the strange situation. They seek proximity but have made negative experiences with bodily contact with their primary caregivers in the past.

Disorganized attachment: Infants display contradictory and inconsistent behaviors towards their primary caregiver. This might result from maltreatment by the attachment figure.

Bowlby's and Ainsworth's attachment theory is widely known and taught throughout the psychological community. The original classification system is based on two factors: care and protection (Michael & Snow, 2019). Yet, new research has been done and the theory has been expanded. Michael and Snow (2019) did not classify individuals into one distinct group but rather gave them a score on all the five dimensions of attachment. Therefore, it is possible to score high on more than one distinct attachment pattern. The parent-child relationship is unlikely to be unidimensional, but more an interaction of different dimensions. As the Adult Scale of Parental Attachment – Short Form (ASPA-SF) has been developed to save time in administrating the instrument and to get a retrospective evaluation of patterns of relating as a child towards their parents, this instrument was chosen for this study. Snow et al. (2005; as cited in Michael & Snow, p. 512-513, 2019) found these five dimensions of attachment and defined them as follows:

The *Safe* dimension relates to the perceived warmth and safety in the relationship.

The *Dependent* dimension relates to the perceived lack of autonomy of the child when the parent is not present.

The *Parentified* dimension relates to the child's feeling of responsibility to take care of their parents' needs.

The *Fearful* dimension relates to a relationship in which the child's need for support and attention is not met by their parents.

The *Distant* dimension relates to a relationship in which the child's need for support and attention is not met by their parents.

Research suggests that parent-child relationships influence relationships outside of the family context, with peer or later romantic relationships (Bowlby, 1973). Attachment styles are related to adaptive and maladaptive psychological outcomes (Gidhagen et al., 2018). Securely attached children have a higher positive correlation with self-esteem, self-confidence, and self-resilience and show more adaptive coping strategies, like perseverance and resilience (versus irritation and aggression), than insecurely attached children (Sroufe, 2005). Insecurely attached children depend more on authorities around them, like their teachers, instead of relying on themselves (Sroufe, 2005). Insecurely attached children might be more prone to become dependent on substances once they entered adulthood.

The DSM-V defines substance use disorder (SUD) as a set of symptoms occurring because of using a substance despite often severe problems arising from the use of the said substance (American Psychiatric Association, 2013). In 2017 in the Netherlands, 1,906 deaths were registered with alcohol as the cause and 240 sudden deaths were registered in 2018 with substances included in the Opioid Act as the cause (Netherlands Institute of Mental Health and Addiction, 2020). Among people in the Netherlands older than 18 years, 8.5% were classified as heavy drinkers and 8.5% were excessive drinkers (Netherlands Institute of Mental Health and Addiction, 2020). According to the National Survey on Drug Use and Health (NSDUH) in the United States from 2019 the prevalence of substance use disorders among people aged 18 to 25 is stagnating at 7.5% and 9.3% for Alcohol Use Disorder (AUD) and Illicit Drug Use Disorder (IDUD), respectively. Especially the AUD declined since 2002 from 17.7%, still, we are talking about 3.1 million young adults living in the United States affected by AUD (9.3%). Among people diagnosed with SUD, a higher prevalence of insecure attachment styles is to be found than among a population not diagnosed with SUD

(Gidhagen et al., 2018). Even though the rates of SUDs are already declining it is important to find out the risk and protective factors to prevent the occurrence of SUDs further. In 2017 in the Netherlands, 1,906 deaths were registered with alcohol as the cause (Netherlands Institute of Mental Health and Addiction, 2021).

Another variable that might have an impact on substance abuse is the marital status of the parents. Adverse childhood experiences (ACE) are a known risk factor for adverse health outcomes in adulthood (Hunt et al., 2017). Parental divorce as an ACE is one of these risk factors for substance use in adolescence (Tebeka et al., 2016; Whitesell et al., 2013). Huurre et al. (2006) conducted a longitudinal study and found that both men and women that experienced parental divorce during childhood are more likely to display risky health behavior than those who did not experience parental divorce. A study by Demir-Dagdas (2021) supported the idea that divorce during childhood has a greater effect of parental divorce on behavioral problems when the divorce happened during pre-school than later in life. Hence, in this study, a distinction between parental divorce before the age of six and after the age of six will be made.

Previous research has examined the correlation between attachment styles and substance abuse in adulthood (Gidhagen et al., 2018). There is a lack of research that investigates the moderating role of divorce on substance use. That is why, this study aims to examine the correlation between childhood attachment and substance use in adulthood with divorce as a moderating factor, controlling for gender and age. Research has shown that males are more prone to single and polysubstance use (Ünübol & Sayar, 2020), as well as they are more often diagnosed with substance dependence (de Vogel et al., 2021). Additionally, age has often been reported as a significant risk factor of substance use (Grant et al., 2015; Höhne et al., 2014). Where Grant et al. (2015) found that younger people are at

higher risk for an Alcohol Substance Use Disorder, Höhne et al. (2014) found that single and multiple intensive substance use was higher among older adults.

The first hypothesis expects less risk of substance use when securely attached.

The second hypothesis expects a higher risk of substance use when insecurely attached.

The third hypothesis expects a higher risk of substance use when the parents divorced when the participants were children than when they did not divorce. The largest effect will be expected for parental divorce before the age of six, the second-largest effect after the age of six, and the smallest effect will be expected for no parental divorce during childhood.

The fourth hypothesis is the first moderation hypothesis. It expects that people with a secure attachment style and whose parents divorced have a higher risk of substance use.

The fifth and second moderation hypothesis expects that people with an insecure attachment style and whose parents divorced have the highest risk of substance use. The order of expected effect sizes in both moderation hypotheses is the same as in the third hypothesis.

Method

Participants

Through convenience sampling, 352 responses were gathered. 100 responses had to be excluded due to missing data. There were only two non-binary cases that have been excluded for statistical purposes. The participants were given the option to skip some of the scales due to a lack of a male or female attachment person, hence ten more cases were deleted. The final sample consists of 241 people. The age ranged from 18 to 67 ($M_{age} = 24.46, SD_{age} = 9.559$). There were 186 women ($M_{age} = 24.2, SD_{age} = 9.863$) and 55 men ($M_{age} = 25.31, SD_{age} = 8.476$). Table 1 gives a brief overview of the sample's descriptive statistics of the variables important in this study.

Table 1

*Descriptive Statistics: Age, Gender, Divorce Status, Attachment Style, ASSIST (*N *=241)*

Variable	Mean (SD)	Range
Age	24.46 (9.559)	18 – 67
Gender (% female)	77.2	
No divorce (%)	70.1	
Divorce, before age of six (%)	11.2	
Divorce, after age of six (%)	18.7	
Secure attachment	21.04 (4.742)	8 – 37
Insecure attachment	15.39 (5.067)	8 – 31
ASSIST scores	4.10 (15.39)	0 – 12

Note. SD = standard deviation.

To calculate the necessary sample size an a-priori power analysis has been conducted. For an effect size of 0.2 and the desired power level of 0.8 with an α of .05 and three independent variables in the first set and two interaction effects in the second set of the hierarchical multiple regression analysis, the minimum sample size amounts to 73.

The questionnaire was administered via Qualtrics and was spread via multiple social media platforms (LinkedIn, Facebook, Instagram, WhatsApp) in collaboration with two other students. The questionnaire took about 20 minutes because there were also other instruments used that are not relevant for this study. The only requirement for participation was being at least 18 years old. Participation was voluntary and no incentives were given. Data were processed anonymously and confidentially. This study was approved by the Ethical Review Board.

Measures

Adult Scale of Parental Attachment – Short Form (ASPA-SF)

The Adult Scale of Parental Attachment (ASPA) found a five-factor classification of attachment: safe, dependent, parentified, fearful, and distant (Snow et al., 2005; as cited in Michael & Snow, 2019). To assess attachment retrospectively in this study the short form of the ASPA is used (Michael & Snow, 2019). According to Michael (2015) the dimensions safe, dependent, and parentified adhere to secure attachment, and the dimensions fearful and distant adhere to insecure attachment. The five-point Likert type scale ranges from 1 (never) to 5 (constantly).

The reliabilities reported by Michael & Snow (2019) are similar to those reported in this study. A Cronbach's alpha of 0.7 and higher can be interpreted as good. For this study, this is given in all cases except for fearful and parentified attachment to mother (see Table 2).

In the following, example questions of the ASPA-SF subscale mother figure are provided:

1. I had my mother with me when I was upset.
2. I resented y mother spending time away from me.
3. I was helpless without my mother.

Answer options were never, seldom, sometimes, frequently, and constantly. The range of scores that could be obtained is from 20 to 100 points on each scale (mother and father), on each subscale 4 to 20. For this study, the two scales assessing the relationship with mother and father were combined to figure out a general attachment pattern. Secure attachment is computed and average out of the subscales safe, dependent, and parentified attachment, a minimum score of 8 and a maximum score of 40 could be achieved. Insecure attachment is computed and averaged out of the subscales fearful and distant attachment, a minimum score of 8 and a maximum score of 40 could be achieved. Michael & Snow (2019) provide a scoring sheet with which the4 different patterns have been coded, which can be found in Appendix A among a full item list of the instrument.

Table 2

Cronbach's alpha for Dimensions on the ASPA-SF

Variable	α
Mother Safe	.892
Father Safe	.893
Mother Dependent	.731
Father Dependent	.728
Mother Parentified	.674
Father Parentified	.746
Mother Fearful	.626
Father Fearful	.775
Mother Distant	.816
Father Distant	.818
Scales Combined	
Parents Secure	. 841
Parents Insecure	.866

Note. α = Cronbach's alpha.

Alcohol, Smoking and Substance Involvement Screening Test (ASSIST)

To assess the risk of problems due to substance use this study uses the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) by the World Health Organization (WHO) (Humeniuk et al., 2010). This tool assesses the use of tobacco, alcohol, cannabis, cocaine, amphetamines-type stimulants (ATS), sedatives and sleeping pills (benzodiazepines), hallucinogens, inhalants, opioids, and 'other' drugs. It does not assess SUD. The outcomes of this questionnaire are lower, moderate, and high risk of substance abuse.

Because there are only four respondents that answered they have ever used opioids, ten that have ever used inhalants, and only three that have ever used other substances, these categories will be excluded from the analysis. According to the National Drug Monitor (2019), there are hardly any opioid users. This is also represented in this study. Sedatives do not correlate with most of the substances, hence they were excluded from the analysis. The reliabilities of the six remaining subscales will be reported in Table 3.

There were seven questions asked per type of drug. Each could be answered with yes or no, a five-item Likert scale (never, once or twice, monthly, weekly, daily or almost daily), or a three-item Likert scale (No; yes, in the past three months; yes, but not in the past three months). The eighth question asked about intravenous use and was not considered for this study, none of the participants responded that they ever used drugs intravenously. In the following, example questions are listed:

1. In your life, which of the following substances have you ever used (non-medical use only)?
2. In the past three months, how often have you used the substances you mentioned (first drug, second drug, etc.)?
3. During the *past three months*, how often have you had a strong desire or urge to use (first drug, second drug, etc.)?

The minimum score to achieve is 0. Maximum scores are 31 and 39 for tobacco products and all other nine types of drugs, respectively. Maximum scores are different for tobacco as question five is only coded for the other substances, therefore there are a maximum of 8 points less to achieve on tobacco use. The full questionnaire with the according coding can be found in Appendix B.

Table 3

Cronbach's alpha for Subscales of ASSIST

Variable	α
Tobacco	.799
Alcohol	.736
Cannabis	.836
Cocaine	.841
Amphetamine	.839
Hallucinogens	.835

Note. α = Cronbach's alpha.

Divorce

Participants were asked to indicate their parents' marital status. The variable divorce has been divided into not divorced, divorced before the age of six, and divorced after the age of six. As already established in the introduction, divorce is a known risk factor of substance use in adolescents (Tebeka et al., 2016; Whitesell et al., 2013). Previous literature has also shown that divorce has a larger impact on psychological outcomes when it happened before the age of six (Sirvanli-Ozen, 2005). Thus, in this study, I want to test whether the age at parental divorce makes a difference in substance use.

Age & Gender

At the end of the questionnaire, the participants were to indicate their age and gender. The different answer options for gender were female, male, non-binary, and prefer not to say. Both will be included as covariates if needed.

Procedure

Participants received an anonymous Qualtrics link to start the survey. They were going through four different questionnaires, starting with the ASSIST and ASPA-SF. The

remaining two questionnaires are not further interesting for this study, they were collected in collaboration with two other Bachelor students. For each questionnaire, specific instructions were given, which can be found in Appendix A and B. At the end of the questionnaire questions regarding age, divorce of parents, and gender had to be answered. The average duration time was 105 minutes. This can be explained in different ways, many participants were not English native speakers or completed the survey over the course of a few days. Because of this, the participants were not excluded from the analysis.

Statistical Analyses

Data and Variables

The independent variables are safe attachment and insecure attachment, each consists of the mean score of the corresponding dimension of relating. Divorce, as the moderating variable, has three categories: no; yes, before the age of six; yes, after the age of six. The outcome variable is the mean score of the six substances included in the analysis (tobacco, alcohol, cannabis, cocaine, amphetamines, hallucinogens). Sedatives have been excluded because of low correlations with most substances included in the analyses. Inhalants, opioids, and 'other' substances have been excluded from the analyses as there were not enough people responding that they ever used these substances. If needed, gender (male, female) and age will be used as control variables.

There were no outliers except for very high duration times. These cases have not been removed from the analyses. If participants answered no to the first question on any type of substance, all six following questions were not displayed to them regarding that drug. Hence, missing values had to be replaced with zero. Participants were able to skip the ASPA-SF if they could not recall having a mother or father figure. These ten cases have been excluded.

Assumptions

After checking the histograms of all included variables normality of distribution can be assumed. Linearity can also be assumed as the normal probability plot of the regression standardized residual shows a reasonably straight line. The assumption of homoscedasticity has not been violated, which can be taken from the rectangularly distributed points on the scatterplot of the standardized residuals. Observations were independent. Regarding the assumption of multicollinearity, independent variables were not correlated higher than .3, which would be desirable. Independent variables were not correlated higher than .7, so no variable had to be omitted. Most variables have a Variance inflation factor (VIF) lower than ten. Secure attachment and the interaction term of secure attachment and divorce have VIF scores of 10.555 and 11.234, respectively. These variables are highly intercorrelated independent variables and it should be considered to remove these from the model.

Hypotheses Testing

For the analyses, SPSS 28 (IBM Corp., 2021) was used. To examine whether gender and age should be included as covariates an independent samples t-test and a correlational analysis have been administered. Subsequently, the following hypotheses will be tested with a multiple regression analysis that includes three steps.

The first hypothesis predicts less substance use when securely attached.

The second hypothesis predicts more substance use when insecurely attached.

The third hypothesis assumes a higher risk of substance use when the parents divorced when the participants were children than when they did not divorce. The largest effect was expected among participants whose parents got divorced when they were younger than six years, then when parents divorced when the participants were older than six years, and the smallest effect for when the parents did not get divorced.

The fourth hypothesis is the first moderation hypothesis. It assumes that people with a secure attachment style and whose parents divorced have a higher risk of substance use.

The fifth and second moderation hypothesis assumes that people with an insecure attachment style and whose parents divorced have the highest risk of substance use in this study design.

Results

Preliminary Analyses

Descriptive Statistics

In Table 4 the descriptive statistics of the ASPA-SF and ASSIST are displayed. The mean score of secure attachment to parents is overall higher than all other insecure attachment styles. The highest scores on the ASSIST are found for the substances tobacco, alcohol, and cannabis. This is in line with the socially accepted substances within the Netherlands.

Pearson Correlations Between Variables

As can be seen in Table 5, most drugs correlate with each other. Because of the low responses on inhalants, opioids, and 'other' substances they will be excluded from the analysis. Sedatives will be excluded as well, as they do not correlate with most of the substances.

Covariates

To test whether there are gender differences in substance use a one-sided independent samples t-test has been administered. Lavene's test for equality of variances shows that equal variances cannot be assumed for risk of substance use ($F = 6.985$, $p = .009$). There was a significant difference in scores for males ($M = 5.57$, SD = 3.127) and females (M = 3.66, SD = 2.512; t(75.767) = 4.141, p < .001) on substance use. The effect size was large with a Cohen's d of .715. gender will be included as a covariate in the following analysis.

After correlating age and substance use scores a Pearson's r of -.009 ($p = .893$) has been found. Thus, age can be excluded as a covariate from further analysis.

Table 4

*Means, Standard Deviations, Range of Mean Scores, and Cronbach's alphas (*N = *241)*

Variable		Mean	*SD*	Range	α
ASPA-SF Parents Combined					
	Secure Attachment	21.04	4.742	8 – 37	.841
	Insecure Attachment	15.39	5.067	8 – 31	.866
ASSIST					
	Tobacco	4.74	7.518	0-31	.799
	Alcohol	8.39	7.299	0 – 35	.736
	Cannabis	4.15	7.202	0 – 37	.836
	Cocaine	0.33	1.640	0 – 17	.841
	Amphetamines	0.61	2.146	0 – 15	.839
	Inhalants	0.13	0.763	0 – 9	.832
	Sedatives	0.51	2.412	0 – 26	.838
	Hallucinogens	0.51	1.669	0 – 11	.835
	Opioids	0.04	0.327	0 – 3	.834
	Other	0.07	0.793	0 – 12	.849

Note. SD =standard deviation, α= Cronbach's alpha.

Moderator

To check whether it makes a difference if divorce happened before the age of six, after the age of six, or no divorce a one-way ANOVA has been conducted. The assumption of homogeneity of variance has not been violated ($F = 1.206$, $p = .301$).

Table 5

*Pearson's Correlations (r) between Substances (*N = *241)*

Substance	Tobacco	Alcohol	Cannabis	Cocaine	Amphetamine	Inhalants	Sedatives	Hallucinogens	Opioids	Other
Tobacco	1									
Alcohol	.308**	1								
Cannabis	.404**	.291**	1							
Cocaine	.365**	.119	.275**	1						
Amphetamines	.384**	.227**	.322**	.483**	1					
Inhalants	.286**	.214**	.228**	.517**	.380**	1				
Sedatives	.293**	.099	.088	.170**	.054	.017	1			
Hallucinogens	.382**	.369**	.342**	.242**	.525**	.300**	.032	1		
Opioids	.340**	.172**	.024	.340**	.189**	.128*	.068	.297**	1	
Other	.127*	.173*	-.003	-.017	-.024	-.015	.034	-.026	-.011	1

**p<.02, *p<.05.

As expected, Participants in the divorce after the age of six group also had higher scores on the ASSIST than participants in the no divorce group. Despite that, there was no statistically significant difference at the $p < .05$ level in ASSIST scores for the three groups of divorce: F (2, 238) = 1.103, p = .333. The effect size, calculated using eta squared, was .009. for further analysis, the two groups divorce before and after the age of six will be combined and separated from the group no divorce during childhood.

Main Analysis

Hierarchical multiple regression was used to assess the significance of insecure and secure attachment and divorce to predict the risk of substance use, after controlling for the influence of gender. Gender was entered at step 1, explaining 8.3% of the variance in substance use.

After entry of the variables insecure and secure attachment and the dichotomous variable of divorce at step 2, the total variance explained by the model was 16.6% F (4, 236) = 11.765, $p < .001$. These three predictor variables explained an additional 8.3% of the variance in substance use, after controlling for gender, R squared change = .083, F change (3, 236) = 7.825, $p < .001$. The assumption that secure attachment predicts less substance use has been rejected (*beta* = -.102, p = .102), but not the assumption that insecure attachment predicts higher substance use (*beta* = .266, $p < .001$). The third hypothesis assumes higher substance use in participants whose parents got divorced, independent of age at divorce. The results of the analysis were not significant (*beta* = .022, p = .718).

The interaction terms divorce by insecure attachment and divorce by secure attachment were entered in step 3, explaining 8.9% of the variance F (6, 234) = 8.729, $p <$ .001. The interaction terms explained an additional 1.7% of the variance in substance use, after controlling for gender, R squared change = .017, F change (2, 234) = 2.382, p = .095. In the final model, the control variable gender (*beta* = -.294, $p < .001$) and the interaction term

between divorce and insecure attachment (*beta* = .391, *p* = .034) were statistically significant. The assumption that divorce strengthens the relationship of secure attachment and substance use has been rejected (*beta* = -.170, *p* = .392). Table 6 gives an overview of the three models of the hierarchical regression analysis.

Table 6

Coefficient Table of Regression Model with Substance Use as the Dependent Variable

	Model	Standardized coefficients		95% CI			
		Beta	SE	LL	UL	t	Sig.
1	(Constant)		0.744	6.006	8.938	10.038	<.001
	Gender	-.289	0.409	-2.711	-1.100	-4.661	<.001
2	(Constant)		1.239	3.891	8.772	5.112	<.001
	Gender	-.290	0.400	-2.702	-1.127	-4.790	<.001
	Secure Attachment	-.102	0.036	-.132	0.012	-1.640	.102
	Insecure Attachment	.266	0.033	0.081	0.210	4.435	<.001
	Divorce	.022	0.022	-0.601	0.872	0.362	.718
3	(Constant)		2.778	2.378	13.324	2.826	.005
	Gender	-.294	0.398	-2.725	-1.158	-4.883	<.001
	Secure Attachment	.037	0.112	-0.200	0.243	0.195	.846
	Insecure Attachment	-.093	0.099	-0.246	0.144	-0.517	.606
	Divorce	-.007	0.392	-0.817	0.728	-0.113	.910
	Interaction Secure Divorce	-.170	0.087	-0.245	0.097	0.858	.392
	Interaction Insecure Divorce	.391	0.072	0.12	0.296	-2.132	.034

Note. N = 241. CI = confidence interval; LL = lower limit; UL = upper limit.

Discussion

The general outline of this study was to examine whether secure and insecure attachment and parental divorce have an impact on substance use in adulthood. This research question was separated into five hypotheses. Two out of these could be supported.

The first hypothesis that secure attachment predicts less substance use could not be supported. Being securely attached might not necessarily be a protective factor for substance use, but securely attached children rely more on adaptive coping mechanisms (Sroufe, 2005). Adaptive coping mechanisms do not necessarily exclude substance use in general, though results show that secure attachment is not related to substance use. Khodarahimi et al. (2021) also found a negative relationship between secure attachment and the Attitude towards Substance Use Scale (ASUS), respectively a positive relationship between insecure attachment and the ASUS. Participants scored on both variables, secure and insecure attachment, which enabled them to have high or low scores on both. If participants were assigned to either secure or insecure attachment, there might have been a stronger negative effect on substance use among securely attached participants. This study specifically used an instrument on which one could score on multiple dimensions of attachment, because not only scoring on one dimension seems more realistic and applicable to reality. As this instrument is a retrospective measurement of childhood attachment to parents, this might limit the validity of the actual attachment styles at hand during childhood. A cross-sectional or longitudinal study could be conducted to avoid this limitation. As established earlier in this section, multicollinearity cannot be assumed with the independent variable secure attachment (and the interaction term secure attachment by divorce). Either a different measure of secure attachment or removing this variable from the model would be appropriate.

The second hypothesis states that insecure attachment predicts more substance use could be supported. Among psychiatric outpatients diagnosed with SUD insecure attachment

is highly represented, with treatment these could develop secure attachment styles (Gidhagen et al., 2018). There are multiple reasons why insecure attachment predicts more substance use, as well as other maladaptive outcomes in adulthood. Insecurely attached children display less adaptive coping strategies and resilience than securely attached children (Sroufe, 2005). Substance use could be a display of maladaptive coping strategies with obstacles in life, such as tobacco use to cope with mental health disorders, or alcohol use with the current COVID-19 pandemic (Martínes-Cao et al., 2021).

The third hypothesis states that parental divorce before the age of six has a higher effect on substance use than a parental divorce after the age of six, which in turn has a higher effect on substance use than no parental divorce during childhood. Demir-Dagdas (2021) found that parental divorce in preschool-aged children leads to more alcohol use in adulthood than parental divorce during teenagerhood. Though the analyses indicate similar outcomes, there was no significant effect of divorce on substance use. Thus, the two groups that experienced parental divorce were lumped together. Separated parents and growing up without both parents in the same household might mirror maladaptive relationship patterns which could affect peer and romantic partner relationships (Bowlby, 1973). A limitation of this study might be that the divorce and separation rate is lower than in the general population. About 70% of children living with their non-married parents experience parental separation (Osborne et al., 2007) and 45.8% of children living with married parents experience parental separation (Fagan & Zill, 2011). Future research could gather more participants to have a more representative amount of parental divorce or separation.

The fourth hypothesis, secure attachment interacts with divorce, so that securely attached children of divorced or separated parents have a higher risk of substance use, could not be supported. After insignificant effects of secure attachment and divorce on substance use, an insignificant interaction effect was to be expected.

The fifth hypothesis states that insecure attachment interacts with divorce. This means that the effect of insecure attachment on substance use is strengthened by parental divorce during childhood. The interaction effect was found to be significant, even though the main effect of divorce was not. Children living with only one parent might experience more irregularity and instability. Adding an insecure attachment to an unstable home environment could be an indicator of why those adults have a higher risk of substance use or rely more on substances as a coping mechanism.

Gender was added as a control variable, as many studies already found that men are at a higher risk of substance use or a SUD diagnosis than females (Ünübol & Sayar, 2020; de Vogel et al., 2021). This could also be replicated in this study. The mean of ASSIST scores was higher for males than for females. One of the strongest findings is that males are at higher risk of substance use than females. Gender did affect the outcome variable significantly. Unfortunately, there were only two non-binary responses collected and for the statistical purpose, they had to be excluded. There is barely any research on substance use and non-binary people. Another study could try to get a sample representing also the non-binary population.

Age on the other hand does not seem to affect the outcome variable and therefore, was excluded as a covariate. As the age ranged from 18 to 67 young adults, adults, and young seniors were represented in this sample. The mean age was in the early twenties, which shows that young adulthood was overly represented. This is probably due to the convenience sampling, which was mainly done among Bachelor students and family members. Not only does this limit generalizability on older age or even underage groups, but other factors such as socioeconomic status, previous education, and nationality might be similar among participants. Because of the convenience sampling, I assume most participants to be of

German or Dutch nationality. In future research these factors should be asked as well, to be able to include them as covariates if necessary.

Further, it would be interesting to include parental substance use. Whitesell et al. (2013) listed parental substance use as one of the familial risk factors for adolescent substance use. A study by Yule et al. (2018) found that mothers diagnosed with SUD had a significant impact on their children who often also develop SUD.

Even though there could have been more covariates considered in this study, it was important to include gender and age. To improve the quality of the study inclusion of more covariates would be appropriate. Controlling for socioeconomic status and parental SUD might prove to be useful. Bachman et al. (20011) found that parental socioeconomic status is negatively correlated to substance use.

As already mentioned before, a larger research design that takes the different maladaptive and adaptive attachment patterns into account and the different substances might bring clearer results in terms of risk factors of substance use. The five different attachment styles can be used as five separate independent variables and the different substances can be used as separate outcome variables. Some of the maladaptive attachment patterns might decrease the risk of substance use. The study by Ünübol & Sayar (2020), for example, suggested that anxious attachment leads to less substance use.

The Ethical Review Board permitted this study. Few participants contacted us to inform us about content that triggered them. The survey tapped into the relationships with parents during childhood and substance use, which was for some participants a difficult topic to be confronted with. A short description of the survey was given at the beginning, though a more specific trigger warning should be given.

To summarize, this study elaborates on the knowledge about substance use and its possible predictors. Where secure attachment does not need to be considered a risk factor but

a possible protective factor, insecure attachment in combination with divorce might be considered a risk factor. This is specifically interesting for the treatment of SUDs or decreasing the risk of substance abuse. There was also a clear gender difference found regarding substance use. Males did score significantly higher on the ASSIST. The main limitations of this study are an underrepresentation of older adults and a retrospective measurement of attachment styles. To add to the knowledge of substance use in non-binary populations a larger sample should be collected. The strengths of this study are its relatively large sample size. For a desired power level of 80%, a sample size of 73 was necessary and we collected 241 valid responses. This study also contributes to the knowledge of the effect of divorce on substance use. As more and more children grow up experiencing parental divorce or separation it is important to see what implications this can have on their (mental) health. Even though adults that experienced parental divorce during childhood were underrepresented compared to the general population, divorce does not seem to have a direct effect on substance use.

In conclusion, parental divorce status alone does not affect substance use in adulthood. In combination with an insecure attachment to parents or a parental attachment, figure divorce does affect substance use. Testing several hypotheses helped show this relation. First, insecure attachment did predict higher scores on substance use. Second, divorce does not influence substance use.

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Appendix A

Adult Scale of Parental Attachment – Short Form (ASPA-SF)

Five-Point Likert Scale (1) *never*, (2) *seldom*, (3) *sometimes*, (4) *frequently*, (5) *constantly*, "Please answer all of the following questions on the behavior of the person who you most identified as a father/mother figure while you were a child. This person may have been a step-parent, a grandfather/grandmother, an uncle/aunt, or a man/woman who was unrelated but a primary caregiver. Choose the person you spent the most time with before age fourteen. Should you feel there was not a person in your life who you considered a father/mother figure, do not complete this section. Answer each question individually and as accurately as possible. Do not worry about consistency across answers; we expect contradictions will exist in some cases."

Pattern of relating	Items (N = 40)	
Mother Safe	I had my mother with me when I was upset.	I turned to my mother for many things including comfort and reassurance.
	I talked things over with my mother.	I usually discussed my problems and concerns with my mother.
Mother Dependent	I was helpless without my mother.	I was never certain about what I should do until I talked to my mother.
	I felt it was best to depend on my mother.	I needed my mother to take care of me.
Mother Parentified	I put my mother's needs before my own.	I enjoyed taking care of my mother.

Pattern of relating	Items (N = 40)	
	It was hard for me to get on with my work if my mother had a problem.	It made me feel important to be able to do things for my mother.
Mother Fearful	I resented my mother spending time away from me.	I felt abandoned when my mother was away for a few days.
	I got frustrated when my mother left me alone.	I had a terrible fear that my relationship with my mother would end.
Mother Distant	I felt there was something wrong with me because I was distant from my mother.	I wish there was less anger in my relationship with my mother.
	I often felt angry with my mother without knowing why.	I often felt angry with my mother without knowing why.
Father Safe	I turned to my father for many things including comfort and reassurance.	It was easy for me to be affectionate with my father.
	I talked things over with my father.	I usually discussed my problems and concerns with my father.
Father Dependent	I often felt too dependent on my father.	I felt it was best to depend on my father.
	I needed my father to take care of me.	I was never certain about what I should do until I talked to my father.

Pattern of relating	Items (N = 40)	
Father Parentified	I put my father's needs before my own.	I sacrificed my own needs for the benefit of my father.
	It was hard for me to get on with my work if my father had a problem.	I enjoyed taking care of my father.
Father Fearful	I felt abandoned when my father was away for a few days.	I resented my father spending time away from me.
	I got frustrated when my father left me alone.	I had a terrible fear that my relationship with my father would end.
Father Distant	I worried my father would let me down.	I wish there was less anger in my relationship with my father.
	I often felt angry with my father without knowing why.	I felt there was something wrong with me because I was distant from my father.

Appendix B

Alcohol, Smoking and Substance Involvement Screening Test (ASSIST)

"The following questions ask about your experience of using alcohol, tobacco products, and other drugs across your lifetime and in the past three months. These substances can be smoked, swallowed, snorted, inhaled, or injected (show response card). Some of the substances listed may be prescribed by a doctor (like amphetamines, sedatives, pain medications). For this interview, we will not record medications that are used as prescribed by your doctor. However, if you have taken such medications for reasons other than prescription or taken them more frequently or at higher doses than prescribed, please let me know. While we are also interested in knowing about your use of various illicit drugs, please be assured that information on such use will be treated as strictly confidential."

Question 1: In your life, which of the following substances have you *ever used* (non-medical use only)?		
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)	Yes	No
Alcoholic beverages (beer, wine, spirits, etc.)	Yes	No
Cannabis (marijuana, pot, grass, hash, etc.)	Yes	No
Cocaine (coke, crack, etc.)	Yes	No
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)	Yes	No
Inhalants (nitrous glue, petrol paint thinner, etc.)	Yes	No

Question 1: In your life, which of the following substances have you *ever used* (non-medical use only)?		
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)	Yes	No
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)	Yes	No
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)	Yes	No
Other - specify	Yes	No

Five-point Likert-scale: (0) *never*, (2) *once or twice*, (3) *monthly*, (4) *weekly*, (6) *daily or almost daily*

Question 2: In the *past three months*, how often have you used the substances you mentioned (first drug, second drug, etc.)?
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)

Question 2: In the *past three months*, how often have you used the substances you mentioned (first drug, second drug, etc.)?
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)
Other - specify

Five-point Likert-scale: (0) *never*, (3) *once or twice*, (4) *monthly*, (5) *weekly*, (6) *daily or almost daily*

Question 3: During the *past three months*, how often have you had a strong desire or urge to use (first drug, second drug, etc.)?
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)

Question 3: During the *past three months*, how often have you had a strong desire or urge to use (first drug, second drug, etc.)?
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)
Other - specify

Five-point Likert-Scale: (0) *never*, (4) *once or twice*, (5) *monthly*, (6) *weekly*, (7) *daily or almost daily*

Question 4: During the *past three months*, how often has your use of (first drug, second drug, etc.) led to health, social, legal or financial problems?
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)

Question 4: During the *past three months*, how often has your use of (first drug, second drug, etc.) led to health, social, legal or financial problems?
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)
Other - specify

Five-point Likert-Scale: (0) *never*, (5) *once or twice*, (6) *monthly*, (7) *weekly*, (8) *daily or almost daily*

Question 5: During the *past three months*, how often have you failed to do what was normally expected of you because of your use of (first drug, second drug, etc.)?
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)

Question 5: During the *past three months*, how often have you failed to do what was normally expected of you because of your use of (first drug, second drug, etc.)?
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)
Other - specify

Three-point Likert-Scale: (0) *never*, (3) *yes, but not in the past three months*, (6) *yes, in the past three months*

Question 6: Has a friend or relative or anyone else *ever* expressed concern about your use of (first drug, second drug, etc.)?
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)

Question 6: Has a friend or relative or anyone else *ever* expressed concern about your use of (first drug, second drug, etc.)?
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.)
Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.)
Other - specify

Three-point Likert-Scale: (0) *never*, (3) *yes, but not in the past three months*, (6) *yes, in the past three months*

Question 7: Have you *ever* tried to cut down on using (first drug, second drug, etc.) but failed?
Tobacco products (cigarettes, chewing tobacco, cigars, etc.)
Alcoholic beverages (beer, wine, spirits, etc.)
Cannabis (marijuana, pot, grass, hash, etc.)
Cocaine (coke, crack, etc.)
Amphetamine-type stimulants (speed, meth, ecstasy, etc.)
Inhalants (nitrous glue, petrol paint thinner, etc.)
Sedatives or sleeping pills (diazepam, alprazolam, flunitrazepam, midazolam, etc.)

Question 7: Have you *ever* tried to cut down on using (first drug, second drug, etc.) but failed?
Hallucinogens (LSD, acid, mushrooms, trips, ketamine, etc.) Opioids (heroin, morphine, methadone, buprenorphine, codeine, etc.) Other - specify

Three-point Likert-scale: *never*, *yes, but not in the past three months*, *yes, in the past three months*

Question 8: Have you *ever* used any drug by injection (non-medical use only)?