



The Influence of Different Dimensions of the Parent–Child Relationship in Childhood as Longitudinal Predictors of Substance Use in Late Adolescence. The Mediating Role of Self-Control

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Abstract

This study examined longitudinal links between several dimensions of parent–child relationship and adolescent substance use, and tested the role of self-control in mediating these. Data came from the Zurich Project on the Social Development from Childhood to Adulthood. Validated questionnaires were used to measure parent–child domains at age 11, self-control at age 13, and substance use at ages 13, 15, 17, and 20. Low positive parenting and parental supervision, as well as aversive parenting, correlated with substance use. Linear regression model revealed that aversive parenting, low child disclosure, low positive parenting, and low parental involvement at age 11 predicted substance use at different stages of adolescence. These associations were mediated by low self-control at age 13. Involving parents and increasing their knowledge about desirable parental practices and ways to help their children to develop adequate self-control could be an effective element in substance use prevention strategies.

Keywords Substance use · Parent–child relationship · Self-control · Adolescence

Substance use is a major international health concern. Alcohol and drug use cause approximately 3,000,000 and 500,000 deaths every year, respectively (World Health Organization, 2021). Substance use onset usually occurs in adolescence (Poudel & Gautam, 2017), which is known to be a critical period for brain development, including elevated activation of reward regions and greater plasticity compared to adulthood (Spear, 2013). Hence,

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substance use has been proposed to be even more harmful during adolescence than at any later stage in life (Silins et al., 2014; Sun et al., 2022). Scientific research shows that substance use in adolescence increased the likelihood of early pregnancy, drug dependence, and criminal involvement (Odgers et al., 2008), as well as problematic substance use, physical aggression, and poorer wellbeing in adulthood (Shanahan et al., 2021).

Individual characteristics such as high self-management or self-control have been identified as protective factors against adolescent substance use (Leinberg & Lehmann, 2020; Rodríguez-Ruiz et al., 2021). Similarly, contextual factors such as positive parenting may also protect against adolescent substance use (Trucco, 2020). Although different studies have described risk and protective factors for substance use, little is known about the processes that mediate these associations. Here, we test whether parenting in childhood is associated with self-control, and whether self-control, in turn, predicts later substance use during adolescence and early adulthood.

Dimensions of Parent–Child Relationship and Substance Use

Social capital theory (Putnam, 2000) states that social capital consists of a network of interpersonal relationships, which have a beneficial impact on individuals involved in these networks. Social capital can contribute to positive development and can act as a protective factor against risky behaviors. A systematic review on family social capital conducted by Carrillo et al. (2017) highlighted the importance of family functioning on children's health. This is not surprising taking into account that family context is the first and strongest environment that impacts development (Berk, 2009).

Following the social capital theory, Ferguson and Xie (2012) discovered that adult support is a protective factor against substance use in a sample of homeless youths attending secondary education. Baggio et al. (2016) found that permissive parental values regarding substance use predicted more substance use. Higher levels of substance use were also found in emerging adults (aged 18–25) who experienced more parental psychological control and scored lower on perceived social capital in a study by Yang et al. (2021). Moreover, authoritative and indulgent parenting styles were identified as protective factors against alcohol use (Garcia et al., 2020) and other illicit substance use (Calafat et al., 2014). On the other hand, authoritarian and neglectful parenting styles were associated with more substance use (Tur-Porcar et al., 2019; Vidourek et al., 2018).

Cablova et al. (2016) reported significant associations among increased frequency of alcohol use and low levels of strict rules, family communication, parental control, warmth, and affection. Haugland et al. (2019) found higher levels of cannabis use in adolescents who had conflicts with their parents and low parental monitoring and emotional support. Moreover, low parental supervision, involvement, rules, and positive parenting in adolescence were risk factors for marijuana use (King et al., 2015; Merianos et al., 2020). In sum, most of the previous studies found that parental warmth, monitoring, involvement, and positive parenting are protective factors for substance use, whereas lack of rules and conflicts between parents and children increase the likelihood of adolescent substance use. However, the cross-sectional nature of these studies does not make it possible to establish chronological relations between parenting practices and substance use in their offspring. In addition, a relevant variable to take into account is monitoring, given that most of the studies only measure parental control, while this is a more complex variable that blends elements of child behavior (disclosure) as well as elements of parental behavior (control).

Therefore, is necessary to carry out studies that split the construct “parental monitoring” into two separate variables: child disclosure and parental control (Stattin & Kerr, 2000).

Some longitudinal studies also explored the relation between parenting styles and substance use. Alcohol use is longitudinally predicted by perceived neglectful parenting (Martínez-Loredo et al., 2015) and low levels of positive parenting (Boden et al., 2021). A meta-analysis of 131 longitudinal studies focused on parenting in adolescence associated with later alcohol use found that parental monitoring, parental support, parental involvement, and parent–child relationship quality acted as prospective protective factors against alcohol use (Yap et al., 2017). Although these results report empirical evidence about the long-term effects of parenting on alcohol use, there is still a need for research on this effect at early stages of development and considering other substances.

Valente et al. (2019) investigated the prospective impact of parenting styles on substance use. While neglectful style was a risk factor, authoritative and authoritarian parenting were longitudinal protective factors against the use of several substances. They concluded that parental control (the shared element between authoritative and authoritarian styles) was the key protective factor against adolescent substance use. Adolescent substance use has also been longitudinally linked to neglectful parenting (Berge et al., 2016) and low parental control (Shek et al., 2020) at age 12. Low child disclosure (Marceau et al., 2020) and lability in child disclosure (Marceau & Jackson, 2017) are longitudinal risk factors for substance use. Thus, most of the longitudinal studies carried out to date tested the role of different parenting styles or parental practices in childhood as protective or risk factor for substance use at early adolescence. However, studies about the prospective impact of parenting in childhood on later adolescence and adult substance use are scarce. In addition, there is a lack of consideration of individual characteristics explaining the mediating link between parenting and substance use.

Dimensions of Parent–Child Relationship, Self-Control, and Substance Use

According to the self-control theory of crime (Gottfredson & Hirschi, 1990), criminal and other problem behaviors, such as substance use, are caused by a lack of self-control. According to this theory, inappropriate parental practices sow the seeds of low levels of self-control in their offspring. A meta-analysis by Li et al. (2019), including 191 studies carried out in different countries, concluded that positive parenting is essential in the development of adequate self-control during adolescence. Thus, if low levels of self-control can predict substance use and parental practices relate to self-control, it could be fruitful to empirically test a model where dimensions of parent–child relationship predict substance use, mediated by self-control.

Empirical studies have tested the self-control theory of crime regarding substance use, and demonstrated that low self-control predicts consumption of alcohol (Yun et al., 2016), cannabis (Ford & Blumenstein, 2013), and cocaine (Schaefer et al., 2015), as well as use of other illicit substances (Grindal et al., 2019). Even though the impact of self-control on substance use has been reported in several studies, as well as the importance of favorable parenting in the acquisition of self-control, there is a paucity of research exploring the prospective impact of dimensions of parent–child relationship on substance use via self-control as a possible mediator.

Some cross-sectional studies have approached models that included the mediating effect of self-control in the link between parenting and substance use. Self-control has been suggested to mediate the relation among substance use and ineffective parenting (Kabiri et al., 2020), maternal support (Vazsonyi et al., 2016), or parent–child conflict (Tarantino et al., 2015). Thus, these studies suggest a mediating effect of self-control in the association of adverse parenting and substance use. However, the cross-sectional design of these studies does not allow to establish chronological links among these variables. Therefore, it is still necessary to test the relation between parenting and substance use mediated by self-control through longitudinal research as the number of longitudinal studies focused on this link is still limited. Koning et al. (2014) studied the impact of parenting rules about alcohol use at age 13 on adolescent self-control at age 14 and alcohol use at 15 years in a sample of Dutch students. Stricter rules related to alcohol use at age 13 predicted higher levels of self-control 1 year later, which in turn was related to less alcohol use at age 15. Therefore, the prospective link between alcohol-specific parenting and substance use mediated by self-control was discovered by Koning et al. (2014), but it is still necessary to explore this relation including diverse dimensions of parent–child relationship and substances, as well as test if the effect of dimensions of parent–child relationship on substance use via self-control persists during late adolescence and early adulthood.

The Current Study

There is vast evidence about the prospective impact of parenting on substance use. However, there is a lack of information regarding the effects of different dimensions of parent–child relationship on substance use at different stages of adolescence and early adulthood. Low self-control has been identified as a risk factor for substance use and it is known that adverse dimensions of parent–child relationship can be related to low levels of self-control in adolescents. To the best of our knowledge, there are no studies to date exploring the longitudinal impact of dimensions of parent–child relationship in childhood on substance use in adolescence and early adulthood and a possible mediating role of self-control in general population. Therefore, the aims of the current study were (i) to explore a model of the prospective impact of different dimensions of parent–child relationship in childhood (namely parental involvement, positive parenting, parental supervision, child disclosure, authoritarianism, and aversive parenting) on substance use and (ii) to analyze if these relations are mediated by low levels of self-control.

Based on the social capital theory, we hypothesized that lower parental involvement, positive parenting, parental supervision, and child disclosure, as well as higher authoritarianism and aversive parenting in childhood, are predictors of more substance use later in adolescence and early adulthood. Based on the self-control theory of crime, the relation between the above mentioned dimensions of parent–child relationship and substance use was expected to be mediated by low levels of self-control.

Method

Participants

Data for this research study come from the *The Zurich Project on the Social Development from Childhood to Adulthood* (z-proso) that included an original target sample of 1675 children. Our

analytic sample includes those participants who answered more than 66% of the items of the *Alabama Parenting Questionnaire* at wave 4 (age 11) of data collection. Thus, the current study included 1147 participants (49.1% female) with a mean age of 11.3 years ($SD=0.37$), followed up for 9 years. In 45% of the sample, both parents were born abroad; in the other 55%, at least one parent was born in Switzerland. Of these 1147 participants, 1011 ($M_{age}=13.7$; $SD_{age}=0.4$) were assessed at wave 5, 1080 ($M_{age}=15.4$; $SD_{age}=0.4$) at wave 6, 987 ($M_{age}=17.4$; $SD_{age}=0.4$) at wave 7, and 914 ($M_{age}=20.6$; $SD_{age}=0.4$) at wave 8. Among the participants who could not be followed up, children of non-native speakers and immigrants are over-represented (Eisner et al., 2019).

Instruments

Dimensions of parent–child relationship were measured at age 11 using an adaptation of the *Alabama Parenting Questionnaire* (APQ; Shelton et al., 1996; $\Omega=0.81$) made by z-proso researchers, showing good reliability. This instrument includes 24 items divided into 7 dimensions: *involvement* (6 items; e.g., “Your parents talk to you about your friends or about the other students in your class.”; $\Omega=0.82$), *positive parenting* (2 items; e.g., “Your parents reward you for doing something well”; $\Omega=0.78$), *parental supervision* (2 items; e.g., “If you go out in your free time, your parents ask you where you are going”; $\Omega=0.96$), *child disclosure* (2 items; e.g., “You leave your house without telling your parents where you are going”; $\Omega=0.81$), *authoritarianism* (3 items; e.g., “Your parents are very strict with you when you don’t do exactly as they say”; $\Omega=0.65$), and *aversive parenting and violence* (6 items; e.g., “Your parents slap you”; $\Omega=0.77$). Participants answered on a 4-point Likert scale from 1 (*never*) to 4 (*often/always*).

An adapted version of the *self-control scale* ($\Omega=0.81$) by Grasmick et al. (1993) was administered at age 13 to measure self-control. It was measured by 10 items such as “I often act on the spur of the moment without stopping to think” or “I lose my temper pretty quickly”. The response options ranged from 1 (*false*) to 4 (*true*).

Substance use was measured at age 13 ($\Omega=0.99$), age 15 ($\Omega=0.80$), age 17 ($\Omega=0.75$), and age 20 ($\Omega=0.90$). At age 13, the substances included were soft alcohol (beer and wine), liquors (vodka, gin, etc.), tobacco, and cannabis. At ages 15 and 17, the substances studied were soft alcohol (beer and wine), liquors (vodka, gin, etc.), tobacco cannabis, ecstasy (3,4-methylenedioxymethamphetamine [MDMA]), cocaine, amphetamine/methamphetamine, and LSD/psilocybin. A wider range of substances was measured at age 20: soft alcohol (beer and wine), liquors (vodka, gin, etc.), tobacco, cannabis, stimulants (cocaine, amphetamine/methamphetamine, etc.), ecstasy, and similar hallucinogens, as well as nonmedical use of opioids, tranquilizers, and anabolic steroids. The response options, according to the consumption in the last 12 months, were 1 (*never*), 2 (*once*), 3 (*2–5 times*), 4 (*monthly*), 5 (*weekly*), and 6 (*daily*).

Three *socio-demographic* variables were included: *sex* (1=male, 2=female), *parental migration background* (1=at least one parent born in Switzerland, 2=both parents born abroad), and *socio-economic status* measured using the International Socio-Economic Index (ISEI, Ganzenboom et al., 1992).

Procedure

Z-proso is an ongoing longitudinal prospective study focused on social development, including the life-course development of violence and crime, together with other variables such as

mental health or substance use (Ribeaud et al., 2022). First data collection was conducted in 2004 including students from 56 primary schools randomly selected in Zurich, the largest city in Switzerland. Until 2018, eight waves of data collection have been carried out with a high rate of participation (Ribeaud et al., 2022).

Participants filled in paper-and-pencil questionnaires in their classrooms until age 17 and a computer-based survey in a laboratory at age 20, during approximately 90 min. All participants provided written informed consent before taking part in the data collection, and parental consents were signed when the participants were under 15 years of age. Participants received compensation for their time (from \$30 at age 13, to \$75 at age 20). The study was approved by the regional ethics committee.

Data Analyses

First, the variable *substance use* at each wave was calculated as a total score considering the frequency of use of the different substances. Second, Spearman correlations were performed to test unique associations among substance use at age 13; substance use at age 15; substance use at age 17; substance use at age 20; parental involvement, positive parenting, parental supervision, child disclosure, authoritarianism, and aversive parenting at age 11; and self-control at age 13. *Previous substance use* was coded as a dichotomous variable as follows: 0=no past substance use, 1=the participant reported substance at least once in the past.

After that, linear regression analyses were run to find if dimensions of parent–child relationship at age 11 and low self-control at age 13 predicted substance use at ages 13, 15, 17, and 20. The independent variables were parental involvement, positive parenting, parental supervision, child disclosure, authoritarianism, and aversive parenting at age 11 and low self-control at age 13, as well as sex, parental migration background, and socio-economic status (SES). The dependent variables were *substance use* at ages 13, 15, 17, and 20. The analyses were carried out using software PASW statistics version 25. Instrument's reliability was tested by calculating McDonald's omega for each scale using FACTOR software (Lorenzo-Seva & Ferrando, 2006).

To explore the mediating role of self-control in the link between dimensions of parent–child relationship and substance use, mediation analyses were performed using the PROCESS macro (Hayes, 2013). Specifically, model 4 was run, in which the independent variables (X) were dimensions of parent–child relationship at age 11 significantly associated with substance use in linear regression analyses, the dependent variables (Y) were substance use at each wave, and the mediating variable (M) was self-control at age 13.

Results

Prospective Correlations Among Substance Use, Parental Practices, and Self-Control

As can be seen in Table 1, aversive parenting at age 11 significantly correlated with substance use at age 13 ($r=0.11$, $p<0.01$), age 15 ($r=0.09$, $p<0.01$), age 17 ($r=0.09$, $p<0.01$), and age 20 ($r=0.13$, $p<0.01$). Low child disclosure at age 11 negatively correlated with substance use at age 13 ($r=-0.23$, $p<0.01$), 15 ($r=-0.24$, $p<0.01$), 17 ($r=-0.26$, $p<0.01$), and 20 ($r=-0.23$, $p<0.01$). Low self-control at age 13 was also related to substance use at age 13 ($r=0.36$, $p<0.01$), 15 ($r=0.38$, $p<0.01$), 17 ($r=0.29$, $p<0.01$), and 20 ($r=0.30$, $p<0.01$). Authoritarianism correlated with

substance use at age 17 ($r=0.07$, $p<0.05$) and low positive parenting predicted substance use at age 15 ($r=-0.06$, $p<0.05$) and 17 ($r=-0.07$, $p<0.05$). There was also a negative link between parental supervision and substance use at age 13 ($r=-0.13$, $p<0.01$) and 15 ($r=-0.06$, $p<0.05$).

Longitudinal Predictors of Substance Use

The prospective relation of different dimensions of parent–child relationship at age 11 and self-control at age 13 with substance use later in adolescence and early adulthood is shown in Table 2. Substance use at age 13 and age 20 was predicted by low child disclosure ($B=-0.16$, $p<0.01$ at age 13; $B=-0.10$, $p<0.01$ at age 20), low self-control ($B=0.42$, $p<0.01$ at age 13; $B=0.19$, $p<0.01$ at age 20), and being male ($B=-0.16$, $p<0.01$ at age 13; $B=-0.09$, $p<0.01$ at age 20). Substance use at age 15 was higher among adolescents who reported low child disclosure ($B=-0.08$, $p=0.03$), low positive parenting ($B=-0.10$, $p<0.01$), and low self-control ($B=0.34$, $p<0.01$), as well as more parental involvement ($B=0.11$, $p=0.02$) and higher SES ($B=0.01$, $p=0.05$). Children who reported low child disclosure ($B=-0.12$, $p<0.01$), low self-control ($B=0.28$, $p<0.01$), and higher levels of parental involvement ($B=0.12$, $p=0.03$), together with having non-migrant background ($B=-0.13$, $p<0.01$), were more prone to use substances at age 17. Higher aversive parenting at age 11 also predicted more substance use at age 13 ($B=0.16$, $p<0.01$). Another predictor of substance use at ages 15 ($B=0.45$, $p<0.01$), 17 ($B=0.65$, $p<0.01$), and 20 ($B=0.46$, $p<0.01$) was previous substance use.

The Mediating Effect of Self-Control on the Link Between Dimensions of Parent–Child Relationship and Substance Use

As shown in Fig. 1, aversive parenting and low score in child disclosure at age 11 predicted more substance use at age 13 and age 20 both directly and indirectly (via low self-control). Substance use at age 15 was predicted by high parental involvement, low child disclosure, and low positive parenting at age 11. These relations were direct and also mediated by low self-control at age 11 (Fig. 2). As can be seen in Fig. 3 and Fig. 4, high parental involvement and low child disclosure increased the likelihood of substance use at age 17 and 20 both directly and indirectly (via low self-control).

Discussion

Scientific literature has found robust links between different dimensions of parent–child relationship and adolescent substance use (Yap et al., 2017), as well as between substance use and low level of self-control (Grindal et al., 2019; Yun et al., 2016). Nevertheless, little is known about the prospective impact of dimensions of parent–child relationship and self-control in childhood on substance use later in adolescence and early adulthood. The main objective of the current study was to explore a model focused on the prospective impact of different dimensions of parent–child relationship in childhood (namely involvement,

Table 1 Spearman correlations among substance use at each wave, parental practices, and self-control

	1	2	3	4	5	6	7	8	9	10
1.Substance use W5										
2.Substance use W6	.51**									
3.Substance use W7	.39**	.66**								
4.Substance use W8	.33**	.54**	.72**							
5.Parental involvement	-.05	.02	.06	.04						
6.Positive parenting	-.02	-.06*	-.07*	-.06	.32**					
7.Parental supervision	-.13**	-.06*	-.01	.01	.26**	.08*				
8.Child disclosure	-.23**	-.24**	-.26**	-.23**	.15**	.13**	.19**			
9.Authoritarianism	.03	.04	.07*	.06	-.08**	-.11**	.13**	-.15**		
10.Aversive parenting	.11**	.09**	.09**	.13**	-.15**	-.16**	.01	-.22**	.42**	
11.Low self-control	.36**	.38**	.29**	.30**	-.14**	-.10**	-.19**	-.28**	.06	.13**

* $p < .05$, ** $p < .01$

Table 2 Associations among dimensions of parent–child relationship at age 11, self-control at age 13, and substance use at ages 13, 15, 17, and 20

	Age 13 (W5)		Age 15 (W6)		Age 17 (W7)		Age 20 (W8)	
	B (SE)	p	B (SE)	p	B (SE)	p	B (SE)	p
Parental involvement	.08 (.05)	.12	.11 (.05)	.02	.12 (.06)	.03	.08 (.04)	.04
Positive parenting	<.01 (.04)	.90	-.10 (.04)	<.01	-.06 (.04)	.14	-.02 (.03)	.57
Parental supervision	-.01 (.04)	.72	-.01 (.04)	.78	.04 (.04)	.37	.03 (.03)	.39
Child disclosure	-.16 (.04)	<.01	-.08 (.04)	.03	-.12 (.04)	<.01	-.10 (.03)	<.01
Authoritarianism	-.06 (.03)	.07	<.01 (.03)	.87	.02 (.04)	.64	<-.01 (.03)	.89
Aversive parenting	.16 (.06)	<.01	.04 (.05)	.45	<.01 (.06)	.97	.06 (.04)	.13
Low self-control	.42 (.04)	<.01	.34 (.04)	<.01	.28 (.05)	<.01	.19 (.04)	<.01
Female	-.16 (.04)	<.01	<-.01 (.04)	.84	-.07 (.04)	.09	-.09 (.03)	<.01
Parents' migrant background	-.03 (.05)	.48	-.05 (.04)	.24	-.13 (.05)	.01	-.06 (.04)	.09
SES	<-.01 (<.01)	.40	<.01 (<.01)	.05	<.01 (<.01)	.08	<-.01 (<-.01)	.34
Previous substance use			.45 (.04)	<.01	.65 (.06)	<.01	.46 (.06)	<.01

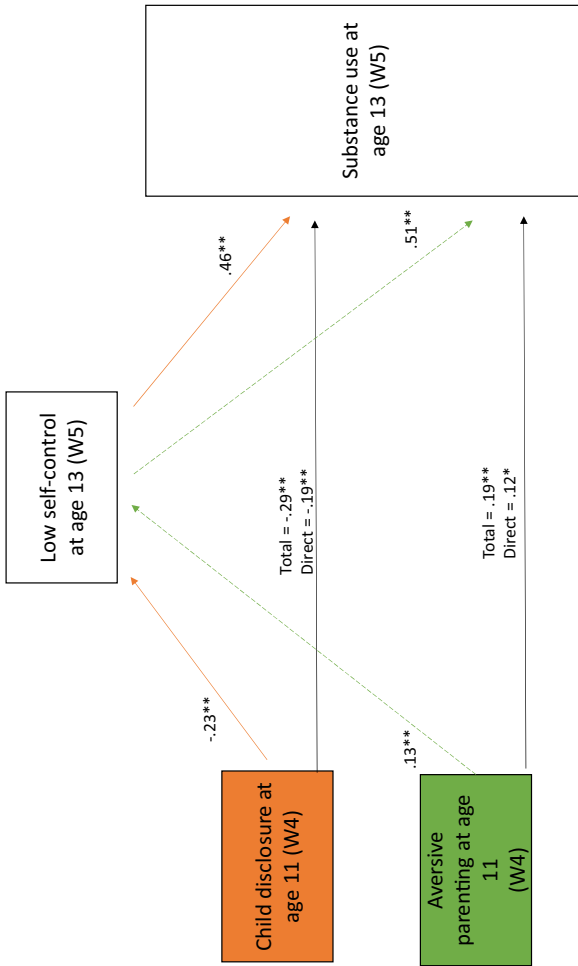


Fig. 1 Mediation model of prospective effects of parental variables at W4 and low self-control (mediating variable) at W5 on substance use at W5. Note: $*p < .05$; $**p < .01$. Indirect effect of dimensions of dimensions of parent-child relationship via low self-control: child disclosure ($\beta = -.11$; $SE = .02$; $95\% CI = [-.14, -.08]$), aversive parenting ($\beta = .07$; $SE = .02$; $95\% CI = [.03, .10]$)

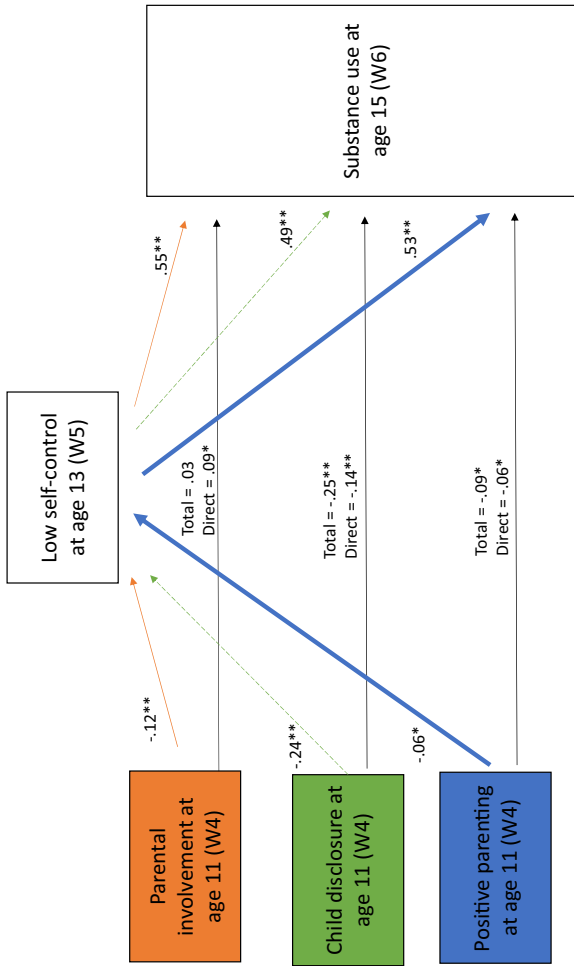


Fig. 2 Mediation model of prospective effects of parental variables at W4 and low self-control (mediating variable) at W5 on substance use at W6. Note: $*p < .05$; $**p < .01$. Indirect effect of dimensions of parent-child relationship via low self-control: parental involvement ($\beta = -.07$; SE = .02; 95% CI = $[-.11, -.03]$), child disclosure ($\beta = -.12$; SE = .02; 95% CI = $[-.15, -.09]$), positive parenting ($\beta = -.03$; SE = .02; 95% CI = $[-.06, -.01]$)

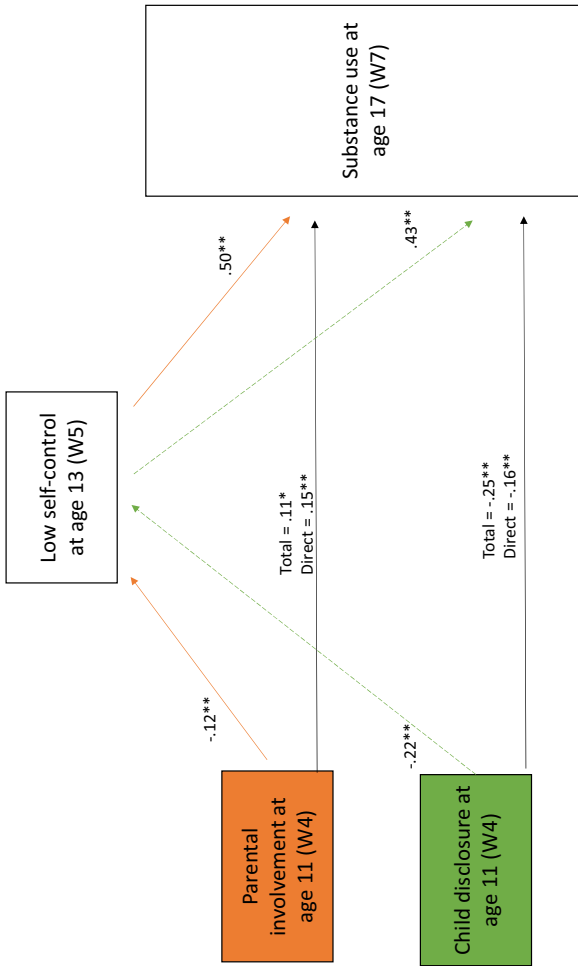


Fig. 3 Mediation model of prospective effects of parental variables at W4 and low self-control (mediating variable) at W5 on substance use at W7. Note: $*p < .05$; $**p < .01$. Indirect effect of dimensions of parent-child relationship factors via low self-control: parenting involvement ($\beta = -.06$; $SE = .02$; $95\% CI = [-.10, -.03]$), child disclosure ($\beta = -.10$; $SE = .02$; $95\% CI = [-.13, -.07]$)

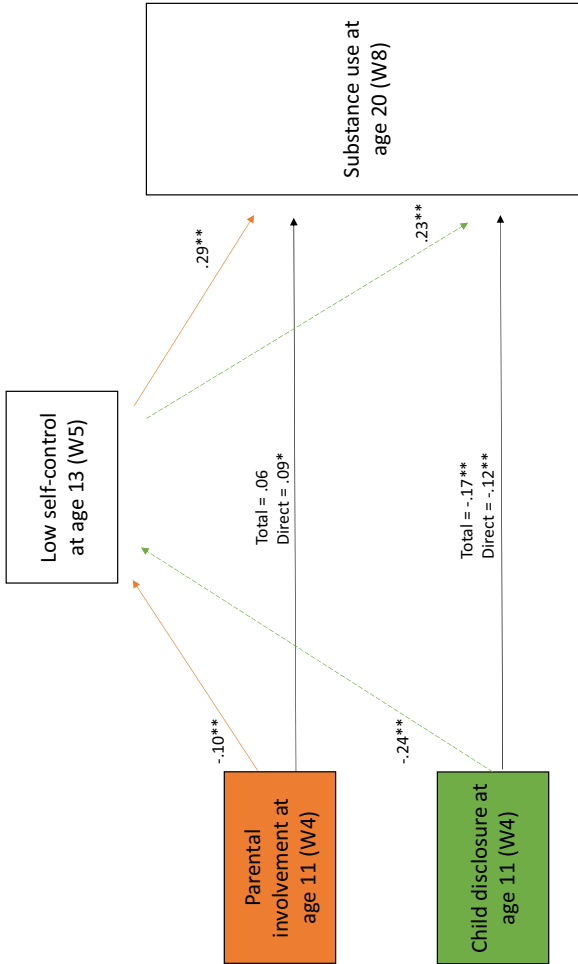


Fig. 4 Mediation model of prospective effects of parental variables at W4 and low self-control (mediating variable) at W5 on substance use at W8. Note: $*p < .05$; $**p < .01$. Indirect effect of dimensions of parent-child relationship via low self-control: parenting involvement ($\beta = -.03$; SE = $.01$; 95% CI = $[-.05, -.01]$), child disclosure ($\beta = -.06$; SE = $.01$; 95% CI = $[-.08, -.04]$), aversive parenting ($\beta = -.03$; SE = $.01$; 95% CI = $[.01, .05]$)

positive parenting, parental supervision, child disclosure, authoritarianism, and aversive parenting) on subsequent substance use mediated by self-control.

Our first hypothesis based on the social capital theory (Putnam, 2000) stated that desirable parental practices would provide adolescents with a social capital that would decrease the odds of substance use. In line with scientific literature (Boden et al., 2021; King et al., 2015; Merianos et al., 2020), positive parenting was a protective factor against substance use in middle adolescence. Feeling valued by parents during childhood could be related to a higher social capital in adolescents, which in turn could prevent them from substance use. Low child disclosure was the most persistent predictor through time, with an impact on substance use up to adulthood. This suggests the necessity of making parents aware of the importance of building healthy and open relationships promoting communication (Yap et al., 2017). Surprisingly and in contrast with previous studies (King et al., 2015; Merianos et al., 2020; Yap et al., 2017), higher parental involvement was a risk factor for substance use in our sample. It is possible that this parental involvement occurs in families where substance use is a common behavior, which makes adolescents perceive substance use as a desirable behavior. This is congruent with the results by Baggio et al. (2016), who suggested lower social capital is associated not only with higher substance use in terms of lack of social resources, but also with the positive attitudes to substance use in the surrounding context. More research is needed to confirm this. In addition, in line with previous studies, the strongest predictor of substance use was substance use in the past (Zych et al., 2020).

Based on self-control theory of crime (Gottfredson & Hirschi, 1990), our second hypothesis stated that low level of self-control would be a risk factor for substance use. Consistent with this hypothesis, low self-control resulted to be a consistent predictor of substance use through all waves measured from early adolescence to adulthood. This finding is in line with cross-sectional studies that related low self-control and substance use (Ford & Blumenstein, 2013; Grindal et al., 2019; Schaefer et al., 2015; Yun et al., 2016). Moreover, we explored to what extent self-control mediated the link between parental practices and substance use. Mediation analyses showed that self-control mediated this association. Yet, a study by Koning et al. (2014) found that the longitudinal effect of parental actions related to alcohol use in their offspring was mediated by self-control. However, to the best of our knowledge, there are no published studies to date that explore the mediating effect of self-control in the link between diverse dimensions of parent–child relationship and the consumption of a wide range of substances from childhood to adulthood.

The current study has important strengths, but also some limitations. The biggest strength is its longitudinal design, providing a prospective insight from childhood to adulthood. Although chronological links among dimensions of parent–child relationship, self-control, and substances were found, it should be considered that causal associations cannot be established. Furthermore, we used a wide sample with a high retention rate, which gives a broad overview of the phenomenon in diverse participants. Even though the sample was broadly representative of Zürich population, these results may not be generalizable to other countries or cultures. However, this limitation can be overcome given the heterogeneity of the sample, with more than 50% of the parents born abroad in more than 80 different countries. Data were collected using self-reports. The validity of self-reports to measure different problem behaviors has been confirmed (Gomes et al., 2018), albeit it can entail different response biases, such as social desirability. Future studies could use other objective methods to measure substance use (e.g., hair analyses; Steinhoff et al., 2022) and explore whether substance use can longitudinally reduce levels of self-control or even if

substance use by adolescents has an impact on parental practices. This would provide a more complex knowledge about the interrelation among these variables. Cross-national research comparing diverse samples from different countries and cultures is also needed to test to what extent these findings could be generalized.

Even with some limitations, these results have important implications for policy and practice. Substance use prevention programs in adolescence should not only be focused on the target population (adolescents), but they also should include parents. Involving parents and increasing their knowledge about desirable parental practices and ways to help their children in the developing of adequate self-control could be an effective element in substance use prevention.

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Declarations

Ethics Approval None.

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