

Do Self-Control and Parental Involvement Promote Prosociality and Hinder Internalizing Problems? A Four-Wave Longitudinal Study from Early to Mid-to-Late Adolescence

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Abstract

The present study investigated the longitudinal associations of self-control and parental involvement with prosociality and internalizing problems from early to mid-to-late adolescence, within a developmental cascade framework. We used a panel design (i.e., four measurement times at 2-year intervals from 2008 onwards) to examine data on 1,523 Swiss adolescents when they were aged about 11, 13, 15, and 17. A cross-lagged analytical approach was used to respond to our purpose. Results showed that parental involvement promotes later levels of prosociality from early to mid-to-late adolescence. Furthermore, we observed that parental involvement predicted later improvements in self-control and that prosociality and internalizing problems mutually and positively predicted each other during the same period. Our findings suggest that interventions aimed at promoting positive parental involvement with their offspring may contribute to later adolescent prosociality and self-control and that health professionals should consider encouraging a healthy balance between self-interest and concern for others.

Keywords: self-control, parental involvement, prosociality, internalizing problems, early adolescence.

Introduction

Early adolescence represents a crucial period in human development marked by the confluence of biological, psychological, and social challenges (Blum et al., 2014). The puberty-related biological events, cognitive and emotional changes, school transitions, increased involvement in peer groups, and greater distancing from parents can all make this stage of life an especially susceptible developmental time (Jun & Choi, 2013). By virtue of these peculiarities, early adolescence is sometimes thought to be a critical phase for the onset of both positive and negative outcomes in later years, such as prosociality and internalizing problems.

On the one hand, the developing “social brain” provides young adolescents with more capacity for effective consideration of others (Blakemore, 2012). This allows for the improvement of their social skills, including prosociality. Prosociality is defined as behavior that voluntarily benefits others (Eisenberg et al., 2015), and it is related to both health and psychological well-being (e.g., Carlo et al., 2012). On the other hand, the prevalence of internalizing problems dramatically increases during early adolescence (e.g., Negri & Susman, 2011). They are broadly defined as mood and affect dysregulations and indicate difficulties in regulating negative emotions, including anxiety and depression (Vazsonyi & Belliston, 2006). Anxiety or depressive disorders are among the most common psychological problems during adolescence, with between one-tenth and one-third of adolescents being affected (e.g., Maldonado et al., 2013; Mojtabai et al., 2016). Internalizing problems in adolescence can have negative impacts on social-emotional development and health with possible repercussions on later stages of life, including the likelihood that internalizing problems persist into adulthood (see Clayborne et al., 2021).

Given the above, it becomes evident that understanding the development of prosociality and internalizing problems during adolescent years is of great value in promoting youth

adjustment in both the short and long term (Duan et al., 2022). As research on risk and resilience postulates (Masten et al., 2021), the levels of adolescent prosociality and internalizing problems are presumably related to a number of factors that might promote positive behaviors and hinder the development of psychopathology. Identifying such factors would be crucial to support adolescents' adaptive developmental trajectories as well as implement prevention and early intervention efforts against psychopathology, with important implications for public health. Particularly, self-control and parental involvement are two factors, at the individual and family level, respectively, that have been shown to be associated with prosociality (e.g., Ng-Knight et al., 2016; Padilla-Walker & Christensen, 2011) and internalizing problems (e.g., Augustine et al., 2022; Oliva et al., 2019). However, previous work has some limitations: It is often based on cross-sectional data (Oliva et al., 2019) or longitudinal data at short intervals (e.g., Li et al., 2022), small samples (Butterfield et al., 2021; Osgood & Muraven, 2015), and/or solely focused on either self-control (e.g., Oliva et al., 2019) or parental involvement (e.g., Fuentes-Balderrama et al., 2020). In contrast, little research has simultaneously addressed the longitudinal relationships of self-control and parental involvement with both prosociality (e.g., Li et al., 2022; Padilla-Walker & Christensen, 2011) and internalizing problems (e.g., Augustine et al., 2022; Situ et al., 2021). Also, to our knowledge, no studies have examined these links over a period from early to late adolescence, despite the potential importance of such links in the emotional and social development of adolescents (Blum et al., 2014). Moreover, authors that have concurrently considered in their investigations both prosociality and internalizing problems are extremely scarce, reporting inconclusive results and only seldom focusing on adolescence (Memmott-Elison et al., 2020a). Yet, studying prosociality and internalizing problems simultaneously might be worthy of consideration given that contemporary extensions of risk and resilience theory suggest that prosocial behavior may act as the "ordinary magic" that leads to everyday resilience,

including fewer problematic outcomes, during adolescence and beyond (Masten, 2001; see Memmott-Elison et al., 2020a). Accordingly, further investigations into these issues are needed.

To address these research gaps, the present study aimed to examine, within a developmental cascade framework (Masten & Cicchetti, 2010), the longitudinal associations of self-control and parental involvement with prosociality and internalizing problems from early to mid-to-late adolescence. To do this, we examined a large sample of adolescents living in Switzerland, using a four-wave longitudinal design with data collected when they were about 11, 13, 15, and 17 years old. We employed a cross-lagged analytic approach to understanding the relationships between the variables of interest, also exploring their bidirectionality. Furthermore, we also analyzed the potential moderating role of gender in the studied longitudinal associations.

Relationships of self-control with prosociality and internalizing problems

Self-control is an umbrella construct that encompasses concepts and measures from different domains (Moffitt, 2012). In general, self-control can be understood as the self-initiated regulation of a person's thoughts, feelings, and behaviors (De Ridder et al., 2012). People who lack self-control tend to display characteristics such as impulsiveness, volatile temper, and risk-seeking (Gottfredson & Hirschi, 1990).

The literature suggests that the ability to self-control can promote prosociality. For example, it has been argued that prosocial behavior requires self-control to overcome selfish and immediate gratification impulses (e.g., Baumeister et al., 2007). Also, neuroimaging research suggests a close link between self-control and prosocial tendencies, as the same brain regions are involved in their activation (Telzer et al., 2011). Studies in the psychosocial field follow in the same footsteps. Osgood and Muraven (2015), for example, found that students in an introductory psychology course with self-control difficulties were less likely to engage in prosocial behavior. Furthermore, DeWall et al. (2008), in samples of college students, found that individuals with

poor self-control were less likely to apply for volunteer work and were less motivated to help under a variety of hypothetical circumstances. However, very few studies have examined the link longitudinally during adolescence. For example, the six-month longitudinal study by Li and colleagues (2022) revealed that high initial self-control is associated with an increase in subsequent prosocial behavior in 12- to 15-year-old adolescents. Furthermore, Ng-Knight et al. (2016) in their one-year longitudinal three-wave study among early adolescents (11 years at baseline) found that higher initial levels of self-control were positively associated with several markers of positive functioning, including prosociality, at the end of the study. Moreover, they showed that less decline in self-control during the study period was linked to higher levels of prosociality. To note, one recent study (Memmott-Elison et al., 2020b) has investigated potential bidirectionality between the two constructs, finding that they were positively related to each other only during early adolescence (i.e., from age 12 to 14), but not during mid-to-late adolescence (i.e. age 14 to 18).

As for the relationships between self-control and internalizing problems, evidence from previous investigations converges to indicate negative associations between these constructs, but most of this research focused on young children (e.g., Flores et al., 2020) or adults (e.g., Situ et al., 2021). Few studies examined these relationships among adolescents. An exception is Li et al. (2015), which found that in samples of Chinese and Italian adolescents aged 12 to 16, self-control was negatively related to concurrent depressive symptoms. Similarly, Jun and Choi (2013) reported that greater self-control was associated with less depression in a sample of Korean adolescents in grades 8 to 12. Furthermore, Oliva et al. (2019) found in a cross-sectional sample of Spanish adolescents and young adults aged 12 to 34 years, that low self-control scores were significantly associated with more anxiety-depression symptoms. However, the cross-sectional design of the above studies makes it impossible to identify the temporal order in the links

between the examined variables. Longitudinal studies are currently scarce. Recently, Situ and colleagues (2021), using a two-wave longitudinal design at a six-month interval with a sample of college students, found that self-control reduces subsequent internalizing problems and vice versa, supporting some form of bidirectionality. Although the study provides valuable information on the longitudinal associations between the two constructs of interest, it includes a short time interval between the two data collections and does not consider the crucial period of adolescence.

Collectively, the above studies identify the need to further investigate the dynamic link between self-control and subsequent prosociality and internalizing problems during the adolescent years. Particularly, it seems relevant to analyze the transition period from early to mid-to-late adolescence.

Relationships of parental involvement with prosociality and internalizing problems

The construct of parental involvement encompasses a wide range of parenting behaviors. In this article, we define it broadly as parents' emotional and behavioral participation in their children's lives, including monitoring and supporting the children (e.g., being interested in what the children are doing, assisting with homework, being available in problems), showing affection (e.g., hugging children in times of depression), spending time together (e.g., having fun together), and communicating (e.g., talking to the children of friends and classmates) (e.g., see Maiya et al., 2020). Previous research has highlighted significant links between parental involvement and both prosociality and internalizing problems.

Some scholars suggested that highly involved parents may enhance their children's empathy (Padilla-Walker & Christensen, 2011) and are more likely to conduct moral talks with them (Carlo et al., 2007), thus prompting youths to internalize prosocial values. Uninvolved parents, on the other hand, could compromise perspective-taking and moral internalization, with the potential

for young people to adopt less prosocial behaviors. Empirical evidence seems to support this claim. For example, Maiya and colleagues (2020) found that parental involvement was positively linked to prosocial behaviors among US Latino adolescents. However, the authors also found that adolescents who exhibited greater prosociality were more likely to have involved parents, but, as they acknowledged, the cross-sectional study design severely limited the ability to draw inferences about the directionality of the associations. In a rare longitudinal investigation, Padilla-Walker and Christensen (2011), using a two-wave longitudinal design, found that maternal involvement was a predictor of prosocial behavior toward the family in early adolescence, suggesting the importance of better understanding the quality of family relationships as predictors of prosocial behaviors. In contrast, Carlo et al. (2011), in a three-wave longitudinal study involving Spanish early adolescents (mean age of 10.84 years at the first wave), found evidence for a positive relationship between parental warmth (including expression of affection and emotional support) and prosocial behaviors concurrently, but a negative association longitudinally.

In terms of associations between parental involvement and internalizing problems, it has been shown that depressive symptoms are less common in adolescents whose parents know about their leisure activities, friends, and whereabouts (Fröjd et al., 2007), while they are more common in adolescents who have difficulty communicating with parents (Yu et al., 2006). However, other authors reported conflicting results. For example, Fuentes-Balderrama et al. (2020) found that parental involvement and communication reduced externalizing but not internalizing problems in Mexican young adolescents. These findings were based on cross-sectional data, and the authors emphasized the importance of future longitudinal research for a more comprehensive picture. In this regard, the few available longitudinal studies suggest that parental involvement may predict lesser internalizing problems over time. For instance, Augustine et al. (2022) found that higher

levels of joint activity and closeness in late adolescence were predictive of a decrease in anxiety disorders in emerging adulthood mediated by increased self-regulation. Finan et al. (2018) found that parental communication in late adolescence predicted a decline in depressive symptoms in emerging adulthood. Very few studies have examined the link between parental involvement and internalizing problems in early adolescence. Deković et al. (2004), in their three-wave study with intervals of approximately one year (mean age 13.4 years at baseline), found that adolescents who had a good quality relationship with their parents, in terms of communication and trust (e.g., “I tell my mother/father about my problems and troubles”), showed a slower increase in internalizing problems. Butterfield et al. (2021) found that what they term maternal warmth, which approximates our definition of parental involvement (example items: “my parent makes me feel better after talking about my concerns with her”; “enjoys doing things with me”) was associated with lower anxiety and depression two years later. However, these findings were based on a small selective sample of adolescents (mean baseline age was 11.58 years) with a prior history of anxiety. It is also worth noting that some authors (see Moberg et al., 2011) found that internalizing problems might predict future parental over-involvement in adolescent girls, albeit other authors did not confirm such an association (e.g., Barbot et al., 2014).

In summary, despite some mixed findings and limitations, previous work highlights the impact that parental involvement may exert on prosociality and internalizing problems. However, the literature seems to lack studies specifically exploring such influences from early to later adolescence, implying the need for further investigation.

Additional potential relationships and gender differences

As stated above, risk and resilience theory highlights the impact of multilevel influences on an individual’s health. It is important to note that these influences are often interrelated and bidirectional and may change based on one’s life course (Masten et al., 2021). Earlier in the

introduction, we reported findings about the associations of self-control and parental involvement with prosociality and internalizing problems, considering also their potential bidirectionalities. Yet, additional relationships between self-control and parental involvement as well as between prosociality and internalizing problems are worth considering, as also indicated by the literature. In a recent meta-analysis, Li et al. (2019) illustrated that positive parenting, including parents' involvement, is an important source of self-control for their children (see also Gottfredson & Hirschi, 1990; Sameroff, 2010), but also they reported that high adolescent self-control may lead to more positive parenting and parental involvement. As an example, parents who spend more time with their children may become more meaningful role models, helping their children manage self-control; at the same time, higher adolescent self-control (e.g., lower levels of self-centeredness) allows them to have better communication with parents and, ultimately, higher involvement of their parents. However, these findings are not always replicated and some studies found no significant longitudinal associations among these constructs (e.g., Baardstu et al., 2017). In addition, some authors emphasized the relevance of considering the connections between prosociality and internalizing problems (Duan et al., 2022; Memmott-Ellison et al., 2020a; Padilla-Walker et al., 2015). Adolescents who engage in prosocial behaviors tend to have better social competence, which might help them process socio-affective information more accurately (Duan et al., 2022), experience positive moods (Schacter & Margolin, 2019), and improve well-being (Layous et al., 2012). These psychological resources related to the helping-behaviors, in turn, might protect against internalizing problems (Memmott-Ellison et al., 2020a; Padilla-Walker et al., 2015). However, high levels of internalizing problems may result in lower levels of prosociality (see Memmott-Elison et al., 2020a), because affect dysregulations, such as anxiety and depression, may tend to distort the process of social attribution. However, given the paucity

of all prior results, further investigations are warranted as well as the need to control for potential bidirectionalities among these variables.

Furthermore, consistent evidence has revealed clear gender differences among adolescents in prosociality, internalizing problems, self-control, and parental involvement. In general, girls tend to be more prosocial (Padilla-Walker & Christensen, 2011) and more affected by internalizing problems (e.g., Deković et al., 2004) than boys, although not all studies confirm such associations (DeWall et al., 2008). Gender differences were also found in parental involvement, which tends to be higher for girls than boys (Fuentes-Balderrama et al., 2020). As for self-control, several studies found that males exhibit poorer self-control than females during adolescence (Wills et al., 2007). Furthermore, boys and girls may react differently to developmental changes in terms of emotions and behavior, thus approaching adolescence and its great transformations in a distinct way (Weisz & Kazdin, 2010). Considering the above, it seems appropriate to explore gender differences in the longitudinal associations investigated in this work. Although some of the available longitudinal studies do not seem to support gender differences (Carlo et al., 2011; Deković et al., 2004; Ng-Knight et al., 2016), the paucity of studies and the importance of gender in appropriately fostering successful adolescent development require further research. Thus, the moderating role of gender was considered in studying the longitudinal associations between self-control, parental involvement, prosociality, and internalizing problems.

The Present Study

In light of the literature gaps previously highlighted and in line with a risk and resilience and a developmental cascade frame of reference, the primary purpose of the present study was to elucidate the extent to which self-control and parental involvement are longitudinally associated with prosociality and internalizing problems from early to mid-to-late adolescence. In order to

advance our understanding of this issue, we employed a fully recursive four-wave longitudinal design involving a large sample of adolescents living in Switzerland. This allowed us to (a) examine whether self-control and parental involvement in early adolescence were associated with internalizing problems and prosociality in later adolescence, and (b) control for bidirectional associations among all constructs included in the model over time. Consistent with prior empirical evidence (e.g., Deković et al., 2004; Ng-Knight et al., 2016; Padilla-Walker & Christensen, 2011; Situ et al., 2021), we hypothesized that (a) higher self-control in early adolescence would be positively associated with prosociality and negatively associated with internalizing problems in later adolescence, and (b) parental involvement in early adolescence would be positively associated with prosociality and negatively associated with internalizing problems in later adolescence. Furthermore, we examined whether the patterns of associations among the analyzed constructs were moderated by adolescents' gender. Therefore, we tested whether or not the longitudinal associations were similar for boys and girls.

Method

Participants

Data for this study were drawn from the XXX research project (*omitted for blind review*), a multi-rater longitudinal study of child and adolescent development that started in 2004 and is still ongoing. The study was conducted in a culturally diverse European urban context, Zurich, Switzerland's largest city. At baseline, the target sample included 1,675 children entering first grade, and aged about seven, from 56 randomly selected primary schools. A detailed description of the sampling approach and target sample characteristics is provided in prior publications (see Ribeaud et al., 2022). In 2004, 1,360 children (81% of the baseline target sample) participated in wave 1; however, non-respondents were periodically recontacted during subsequent waves.

The current study focuses on adolescence and thus used the fourth, fifth, sixth, and seventh waves, which occurred when participants were respectively aged about 11, 13, 15, and 17. Each wave had the following number of respondents: wave 4, $n = 1,147$ ($M_{\text{age}} = 11.33$, $SD = 0.37$; 563 females); wave 5, $n = 1,365$ ($M_{\text{age}} = 13.67$, $SD = 0.36$; 662 females); wave 6, $n = 1,446$ ($M_{\text{age}} = 15.44$, $SD = 0.36$; 697 females); wave 7, $n = 1,306$ ($M_{\text{age}} = 17.45$, $SD = 0.37$; 647 females). In wave 4 (henceforth “T1”), 69% of the initial target sample participated in the study. The attrition rate between waves 4 and 5 was 10.11%. In wave 5 (T2) and wave 6 (T3), the project team was allowed to re-contact the entire initial target sample. As a result, 334 respondents from the target sample (re-)entered in wave 5, increasing the sample size to 1,365 participants, corresponding to 81% of the initial target sample. Attrition between waves 5 and 6 was 2.6%, while 117 respondents from the target sample (re-)entered in wave 6, increasing the sample size to 1,446 respondents (86% of the initial target sample). The attrition rate between waves 6 and 7 (T4) was 11%, while 18 respondents from wave 5 re-entered in wave 7, resulting in a sample of 1,306 respondents (78% of the initial target sample). Overall, considering this pattern of attrition and re-entry from T1 to T4, the final sample for this study included a total of 1,523 adolescents (738 females, 48.5%) participating in at least one wave and the average participation rate across the four waves was 86.4%. In this final sample, about 90% of the participants were born in Switzerland and around 50% had at least one parent born in Switzerland. As the official language in the schools was German, all the participants spoke and understood this language; however, only approximately 60% of them had at least one primary caregiver German-speaking (mostly Swiss or German). The highest primary caregivers’ educational level was as follows: in 20.7% at least one parent held a university degree, in 10.5% at least one parent held a higher vocational apprenticeship, in 42.8% at least one parent held an A-level or full vocational/apprenticeship qualification, and in 26% the highest parental education

was compulsory school qualification or less. According to the International Socio-Economic Index of occupational status (Ganzeboom et al., 1992), the highest primary caregivers' household occupational status scored 45.97 on average ($SD = 19.16$; range 16-90).

We conducted both missingness and attrition analyses to examine whether participants with missing data and those with complete data were systematically different on any available measures that were obtained prior to dropout. A detailed description of these analyses is provided in the supplementary materials (Supplemental Appendix 1). Together, the results suggested only a small violation of missing completely at random assumptions. Therefore, all the 1,523 participants were retained, and the subsequent main statistical analyses were conducted by means of the full-information maximum likelihood procedure (see Eisner et al., 2019; Enders & Bandalos, 2001) available in *Mplus* statistical software.

Procedure

The XXX study was approved by YYY (*omitted for blind review*). Informed consent was sought from parents until the age of 12, then from the adolescents themselves, but parents retained the capacity to withdraw their children until they reached 18 years. Participants completed paper-and-pencil questionnaires administered in German (the research location's official language) throughout 90-minute sessions typically in groups of 5–15, after being coached by two or three trained project collaborators. Data were collected during school lessons at age 11; however, from age 13 onward data were collected in a classroom setting but during leisure time with no teacher present. Because of this, at ages 13, 15, and 17, participants were given a monetary participation compensation (30 CHF at age 13 years, 50 CHF at age 15, and 60 CHF at age 17, with 1 CHF~1 USD).

Measures

The following measures were first developed for use in the English language. The measure versions used in this study were based on pre-existing translations to German, which were adapted slightly to make it more appropriate for administration in Switzerland, and on English retranslation. When some translations did not include the full set of instrument items, omitted items were translated from the original by the research project team. The main adaptation work was the rewording, substitution, or integration of some items to maintain developmental appropriateness for mid-to-late adolescence. A paraphrase of item content in English related to the different measures as well as reliability and validity analyses of the instruments in German language are provided in several previous works (*omitted for blind review*).

Self-Control. Self-control was assessed using an abbreviated scale derived from an adaptation of the Grasmick et al. (1993) self-control scale. The original scale was developed in the realm of criminological research (see, for example, Murray et al. 2016) and covered 6 interrelated domains: impulsivity, self-centredness, risk-seeking, volatile temper, preference for simple tasks, and preference for physical over cognitive or verbal activities. To be consistent with our conceptual definition of self-control outlined in the introduction and the most contemporary research into self-control outside of criminology (e.g., De Ridder et al., 2012; Murray et al., 2016), we excluded the last two domains. We also omitted the self-centredness domain due to its conceptual overlap with the construct of prosociality, which could produce confounding results. Thus, the final scale included six items, two for each of the three remaining sub-domains: impulsivity (e.g., “I often do whatever brings me pleasure here and now, even at the cost of some distant goal”), risk-seeking (e.g., “Excitement and adventure are more important to me than security”), and volatile temper (e.g., “I lose my temper pretty easily”). Items were rated on a 4-point Likert-type scale from *false* (1) to *true* (4). Items were coded in such a way that high scores indicated higher self-control. Prior research has backed up adequate psychometric properties of

this measure in the current sample (e.g., *omitted for blind review*). Cronbach alphas for the overall self-control scale were acceptable, ranging from .67 to .72 across T1 1 through 4.

Parental Involvement. From a youth viewpoint, parental involvement was assessed based on the Alabama Parenting Questionnaire (APQ; Shelton et al., 1996). This instrument assesses parenting practice in five domains: involvement (10 items), positive parenting (6 items), poor monitoring (10 items), inconsistent discipline (6 items), corporal punishment (3 items), and other discipline practices (7 items). As reported in previous works (Rodriguez et al., 2023), we used a shorter version of the parental involvement subscale consisting of six items (e.g., “When you have a problem you can talk to your parents about it”; Rodriguez et al., 2023; see also Huijsmans et al., 2021, for the specific selected items) rated on a 4-point Likert-type scale from *never* (1) to *often/always* (4). Higher scores were indicative of higher parental involvement. Previous findings showed adequate psychometric properties of the APQ parental involvement subscale in the current sample (*omitted for blind review*). Cronbach alphas for the parental involvement measure were acceptable, ranging from .66 to .77 across T1 through 4.

Prosociality. Prosociality was assessed using the prosocial subscale from the self-reported Social Behavior Questionnaire (SBQ; Tremblay et al., 1991) adapted for adolescents (Murray et al., 2017; Murray et al. 2019). Of the original 10 items, eight items were common across all measurement time points (i.e., age 11, 13, 15, and 17) and used in the current study (abbreviated content of excluded items: sympathy for somebody feeling bad and sympathy for somebody bullied). Respondents were asked to indicate which things they had done over the past 12 months using items like “You tried to comfort someone who was crying or was upset” indicative of altruism/pacification, or “You were good at understanding another person’s feelings” indicative of empathy/sympathy. Items were rated on a 5-point Likert-type scale from *never* (1) to *very often* (5). Previous research supported the psychometric properties of the SBQ prosociality

subscale in the current sample (*omitted for blind review*). Cronbach alphas for the prosociality measure were acceptable, ranging from .79 to .82 across T1 through 4.

Internalizing Problems. Internalizing problems were assessed using the anxiety subscale from the self-reported Social Behavior Questionnaire (SBQ; Tremblay et al., 1991) adapted for adolescents (Murray et al., 2017; Murray et al. 2019). The original five items of the SBQ anxiety subscale include three items close to the construct of anxiety, while two other items are close to the construct of depression. One anxiety item (“couldn’t doze off”) and two depression items (“sad without reason” and “bored”) were added to maintain developmental appropriateness in adolescence. Thus, the final scale included eight items, four measuring anxiety and four measuring depression. Respondents were asked to indicate how they had felt over the past month using both anxiety (e.g., “I was scared, fearful, or anxious”) and depression (e.g., “I felt alone”) sub-domains. Items were rated on a 5-point Likert-type scale from *never* (1) to *very often* (5). Prior research demonstrated adequate psychometric properties of the SBQ anxiety-depression subscale in the current sample (*omitted for blind review*). Cronbach alphas for the internalizing problems measure were acceptable, ranging from .74 to .83 across T1 through 4.

Analytical strategy

The purpose of this study was to examine the links of self-control and parental involvement with prosociality and internalizing problems from early to mid-to-late adolescence, taking into account the potential bidirectional associations among these constructs over time. In order to reach this aim, we performed cross-lagged panel analyses with latent variables in *Mplus* 7 (Muthén & Muthén, 2012) using a robust maximum likelihood estimator (MLR) which handles missing data using full information maximum likelihood (Eisner et al., 2019; Enders & Bandalos, 2001). As preliminary steps, we (a) reported means and standard deviations of the main study composite variables as well as their correlations and explored the associations with

sociodemographic variables, (b) modelled the latent factors for each main study construct using a parceling approach (Little et al., 2002) to avoid cumbersome estimations with high numbers of indicators, and (c) examined longitudinal measurement invariance. Then, we tested different cross-lagged models to obtain the most parsimonious final model (see the Results section for a detailed description of the analytic procedure). We relied on well-known goodness-of-fit indices and their associated cutoffs to evaluate the model fit (e.g., Kline, 2015): chi-square (χ^2) test with $p > .05$, CFI and TLI $\geq .90$, RMSEA $\leq .08$, and SRMR $\leq .10$. Acknowledging the sensitivity of the chi-square with large sample sizes, we mostly relied on the last three indices. To ascertain significant differences between nested models (the more vs. less restrictive model), at least two of these three criteria had to be satisfied (Chen, 2007): $\Delta\chi^2$ significant at $p < .05$, $\Delta\text{CFI} \leq -.010$, and $\Delta\text{RMSEA} \geq .015$.

Results

Preliminary analyses

Means and standard deviations of the main study variables are reported in Table 1, while their correlations are displayed in Table 2. To explore whether gender, participants' birth country, parents' migration background, primary caregivers' language, and highest primary caregivers' educational level were predictive of the variability of the main study variables over time, we conducted repeated measures multivariate analysis of covariance (MANCOVA, that permitted to control for within-subjects effects). As a continuous variable, the highest primary caregivers' household occupational status was entered as a covariate. Results for between-subjects effects showed significant multivariate effects of gender, Wilks' Lambda = .95, $F(4, 730) = 9.52$, $p < .001$, $\eta^2 = .05$, and highest primary caregivers' educational level, Wilks' Lambda = .96, $F(12, 1932) = 2.50$, $p = .003$, $\eta^2 = .01$. No interactions effects were statistically significant, except for the two-way interaction between gender and participants' birth country, Wilks' Lambda = .99, F

(4, 730) = 2.56, $p = .04$, $\eta^2 = .01$. However, the last two findings had low practical significance due to negligible effect size values ($\eta^2 = .01$). Thus, as mentioned in the aims of this study, we continued to consider gender as a demographic variable that potentially moderates the relationships among the main study variables over time.

We then modelled latent factors for the main study constructs. Specifically, items for each measurement scale were parceled into indicators each comprising two items, maintaining the item domain structure when it was the case (e.g., impulsivity items for self-control produced an indicator) or using an equal distribution of factor loadings across parcels (e.g., the highest and the lowest item factors loadings produced an indicator). Each parcel was computed by averaging the responses across the two selected items, with higher scores meaning higher levels of the construct. Hence, three parcels were modelled to form the latent factors of self-control and parental involvement, while four parcels were modelled to form the latent factors of prosociality and internalizing problems. Longitudinal confirmatory factor analyses supported the one-factor structure of self-control, $\chi^2(30) = 48.46$, $p = .02$, CFI = .994, RMSEA = .020, SRMR = .020, parental involvement, $\chi^2(30) = 48.95$, $p = .02$, CFI = .996, RMSEA = .020, SRMR = .017, prosociality, $\chi^2(74) = 172.71$, $p < .001$, CFI = .986, RMSEA = .030, SRMR = .027, and internalizing problems, $\chi^2(74) = 195.40$, $p < .001$, CFI = .985, RMSEA = .033, SRMR = .026; this permitted to use the parceling approach for latent modeling also in the subsequent analyses.

Furthermore, we examined longitudinal measurement invariance for the main study measures (see Seddig et al., 2018). Given that the main purpose of the current study was to examine covariance structures, our crucial question was whether metric invariance held across the adolescent developmental period. Thus, for each construct we compared the configural (baseline) model with the metric model, in which factor loadings were constrained to be equal across time. We also tested for scalar invariance to understand whether mean comparisons of

composite variables across time points (as in the previous MANCOVA) were suitable. Findings revealed full metric invariance for all study constructs across the time points; acceptable partial scalar invariance models were also obtained, with a proportion of at most one item intercepts out of three free to be estimated. Detailed results are reported in Supplemental Appendix 2 – Table S1.

Cross-lagged analyses

Building on the integration of the metric invariance models for the constructs in one general model, we then performed the cross-lagged analyses. In the initial cross-lagged model (M1), we tested (a) cross-lagged paths from self-control and parental involvement to prosociality and internalizing problems and vice versa, controlling for bidirectional cross-lagged paths between self-control and parental involvement as well as between prosociality and internalizing problems. Specifically, we included cross-lagged paths between each latent variable at T1 and all the others at T2, T3, and T4, between each latent variable at T2 and all the others at T3 and T4, and between each latent variable at T3 and all the others at T4. We also controlled for (b) 2-year (e.g., self-control at T1 predicting self-control at T2) and 4-year (e.g., self-control at T1 predicting self-control at T3) stability paths and (c) within-time correlations among all variables. This model fit the data well, $\chi^2(1314) = 2413.61, p < .001, CFI = .960, RMSEA = .023, SRMR = .049$

To model the longitudinal associations among the latent constructs as parsimoniously as possible, we checked whether stability paths, cross-lagged effects, and T2-T4 within-time correlations were time invariant. Thus, we compared M1 (the baseline unconstrained model) with the model assuming time invariance of stability paths (M2), cross-lagged effects (M3), and T2-T4 within-time correlations (M4). Findings clearly supported the assumption of time invariance (see Supplemental Appendix 3 – Table S2). Thus, we tested a final model (M5) including all the

previous time invariant constraints, while fixing to zero all non-significant cross-lagged paths.

This model did not significantly differ from M1, $\chi^2(1405) = 2539.99, p < .001, CFI = .959,$
RMSEA = .023, SRMR = .052, $\Delta\chi^2(91) = 128.53, p = .006, \Delta CFI \leq -.001,$ and $\Delta RMSEA = .000.$

This permitted us to retain the most parsimonious model (M5).

Finally, we conducted multigroup analyses to test for moderating effects of adolescent gender (boys vs. girls). We compared the unconstrained multigroup model M1 (MM1), with the constrained models MM2 (in which stability paths were constrained to be equal across groups), MM3 (in which cross-lagged paths were constrained to be equal across groups), MM4 (with both T1 and T2-T4 correlations constrained to be equal across groups), and MM5 (i.e., the final model M5 set to be equal across groups). No significant differences emerged from these model comparisons, suggesting the lack of significant moderating effects of gender. Detailed results for these multigroup analyses are reported in Supplemental Appendix 4 – Table S3. Hence, we focused on the results obtained in the total sample. Stability paths, cross-lagged paths, and within-time correlations among the study constructs are displayed in Figure 1.

Effects of self-control and parental involvement on prosociality and internalizing problems. As can be seen in Figure 1, cross-lagged paths showed no significant effects of self-control on prosociality and of both self-control and parental involvement on internalizing problems, and vice versa. However, parental involvement influenced prosociality, while the inverse effect was not significant. Specifically, parental involvement increased later levels of prosociality from early to mid-to-late adolescence. Furthermore, at T1, both self-control and parental involvement were significantly and positively related to prosociality, but only self-control was significantly, and negatively, associated with internalizing problems. At T2-T4, both self-control and parental involvement were significantly and positively connected to prosociality and negatively linked to internalizing problems.

Relationships between self-control and parental involvement. As indicated in Figure 1, cross-lagged effects highlighted a significant path from parental involvement to self-control, and not the other way around. In particular, parental involvement predicted later improvements in self-control from early to mid-to-late adolescence. Moreover, both at T1 and at T2-T4, self-control and parental involvement were significantly and positively correlated with each other.

Relationships between prosociality and internalizing problems. As shown in Figure 1, cross-lagged effects indicated significant bidirectional linkages between prosociality and internalizing problems. Surprisingly, prosociality positively predicted later internalizing problems and internalizing problems predicted later prosociality from early to mid-to-late adolescence. However, prosociality also exhibited a longer-term effect on internalizing problems. Findings indicated that prosociality predicted increased later levels of internalizing problems not only after a two-year interval but also after a four-year interval. In addition, both at T1 and at T2-T4, prosociality and internalizing problems significantly and positively correlated with each other.

Discussion

In line with a risk and resilience and a developmental cascade framework (Masten, 2021; Masten & Cicchetti, 2010), this study aimed to advance the literature on the role of self-control and parental involvement in promoting prosociality and hindering the risk of internalizing problems from early to mid-to-late adolescence. We hypothesized that higher self-control and parental involvement in early adolescence would be positively associated with prosociality and negatively associated with internalizing problems in later adolescence. To investigate these hypotheses, we used longitudinal data collected from a large normative sample of Swiss adolescents aged about 11, 13, 15, and 17 years.

The results only partially supported our initial hypotheses. In line with our expectations, higher levels of parental involvement at ages 11, 13, and 15 were prospectively associated with

an increase in levels of prosociality two years later. In contrast, higher self-control was not prospectively associated with higher prosociality or less internalizing symptoms, nor did higher parental involvement predict fewer internalizing symptoms. Additionally, we found that higher levels of parental involvement at ages 11, 13, and 15 predicted improvements in self-control two years later. Also, prosocial behavior and internalizing problems positively influenced each other. Furthermore, gender did not moderate the patterns of associations among the analyzed constructs. Taken together, these findings add new evidence to the significance of early adolescence in terms of adolescent future sociopsychological functioning.

Longitudinal relationships of parental involvement with prosociality

Our findings suggest parental involvement as a promotive factor of later prosociality across adolescence. Also, findings revealed concurrent positive bidirectional links between parental involvement and prosociality, opening up the idea of more short-term mechanisms of associations. These patterns of results are consistent with both previous cross-sectional studies (e.g., Maiya et al., 2020) and exiguous longitudinal research focused on a short adolescent time span (Padilla-Walker & Christensen, 2011). It suggests that parental support, dedication, and openness to communication from early to mid-to-late adolescence are important for youth's social and moral development (Blakemore, 2012). A possible underlying mechanism is that parental involvement and joint activities enhance empathy and perspective-taking skills as well as the internalization of prosocial values (Carlo et al., 2007; Padilla-Walker & Christensen, 2011; see also Maiya et al.2020).

The findings underline that, despite the greater distancing from parents and increased involvement in peer groups (Jun & Choi, 2013), mothers and fathers remain an important factor in adolescent social development (Butterfield et al., 2021). More specifically, the extent to which parents are involved with their children predicts prosocial competence throughout adolescence.

Lack of the hypothesized longitudinal relationships

The lack of longitudinal associations from early to mid-to-late adolescence between self-control and later prosociality as well as between self-control and parental involvement with internalizing problems is not in line with our hypotheses and prior work (e.g., Butterfield et al., 2021; Li et al., 2022; Situ et al., 2021). However, the missing prospective association between self-control and prosociality mirrors a similar finding reported by Memmott-Ellison and colleagues (2020b), who argued that intentional self-regulation (including the power to control thoughts and behaviors in a goal-oriented fashion and encompassing self-control) may not affect the development of prosocial behavior because other confounding variables, like moral emotions (e.g., empathy, sympathy, perspective taking, guilt, etc.), could contribute to lowered this relationship. However, another possible explanation is that the link between self-control and prosocial behavior is situational and short-term rather than developmental. In this vein, prosocial behavior has been argued to be the result of a person*situation interaction, whereby self-control is applied to the situational temptations and acts to override short-term selfish impulses and facilitate perspective-taking and cooperative behavior (see Schmidt-Barad & Uziel, 2020). This possibility would also be in line with the observation that positive associations between self-control and prosocial behavior are generally found in cross-sectional studies. Similarly, this study found consistent evidence from ages 11 to 17 for a concurrent association between self-control and prosocial behavior, which may be the result of short-term bidirectional mechanisms.

The missing longitudinal association between self-control and internalizing problems needs to be interpreted in light of the current literature. To date, in contrast to the large volume of studies on the association between self-control and externalizing problems (e.g., Eisenberg et al., 2001), there has been relatively little research on the developmental link between self-control and internalizing problems. Findings are mixed for the period until emerging adulthood. The research

focused on childhood showed contrasting results, with some studies finding negative links between self-control and internalizing problems and others finding positive associations or no relation (see van Prooijen et al., 2018). Investigations focused on adolescence mostly suggest negative links between self-control and internalizing problems, but they are substantially characterized by cross-sectional design (e.g., Oliva et al., 2019). Longitudinal examinations on emerging adults have found a bidirectional negative association between self-control and internalizing problems suggesting a spiral development of these two constructs (see Situ et al., 2021). Taken together, these results suggest that the relationship between self-control and internalizing problems is in a transition stage from early to mid-late adolescence, during which the concurrent correlation between the two dimensions is negative, while there would be no longitudinal reciprocal effects. This can be explained by the high levels of adolescent variability related to both self-control and internalizing problems (e.g., Cohen et al., 2018).

Neurodevelopmental research indicates that neural circuits such as the mesolimbic circuit and the prefrontal cortex undergo rapid changes starting at puberty and reaching full maturity over many years and beyond adolescence (Oliva et al., 2019). These maturational changes, in a concurrent evaluation, can lead to a movement whereby greater self-control abilities (both in terms of inhibitory functions and initiative functions) correspond to fewer internalizing problems and vice versa. However, these same changes, measured at a specific time, may have no long-term effect; for example, the self-control abilities evidenced during early adolescence may not be those required to hinder internalizing problems two or four years later, since the latter may have markedly changed in their characteristics (but in line with the current age) due to the high variability they encounter. Equally, it must be said that a further possible explanation may lie in the choice of the scale used to measure self-control, which, having been developed in the realm

of crime research, could be characterized by a greater sensitivity to the association with externalizing rather than internalizing problems.

In terms of missing longitudinal association between parental involvement and internalizing problems, this result duplicates what was reported by the work of Fuentes-Balderrama et al. (2020), although they use a cross-sectional research design. To justify these findings, these authors suggest that other factors may influence internalizing problems across adolescence, such as low self-esteem, negative body image, parental depression, negative life events/life stress, or problematic peer relationships. Our findings seem to further clarify and add new aspects to this idea: parental involvement may be longitudinally associated with positive psychological outcomes, like prosociality, but not with negative psychological outcomes, such as internalizing problems, while it is possible to conjecture that more negative parenting (e.g., inconsistent discipline and poor monitoring) and parent-adolescent conflict might be associated with internalizing problems (Georgiou & Symeou, 2018). However, this assumption is beyond our study and research on this topic is needed. Yet, the concurrent associations from 13 to 17 years (but not at 11 years) between parental involvement and internalizing problems were significant and negative. This may again suggest, as for other relationships above, that the causal mechanisms that link parental involvement and internalizing symptoms during later adolescence operate over relatively short time spans and may be hard to discover as causal effects when measured over delays of two years. Alternatively, other variables that are forming during adolescence, such as personality, could explain the coexistence of higher levels of parental involvement in the presence of lower levels of internalizing problems (when personality is expressed by positive aspects, such as agreeableness and low neuroticism).

Additional relationships between the study variables

Although investigating the relationships between self-control and parental involvement as well as between prosociality and internalizing problems was not a specific goal of our study, our results pointed to some notable associations between these variables. Parental involvement positively influenced self-control both concurrently and longitudinally. Some prior meta-analyses reported parenting to be a crucial component in distinguishing children with high self-control from those with poor self-control, but only recently this proposition was extended also to later life periods by showing that positive parenting (including involvement) continues to play a key role in shaping adolescent self-control (Li et al., 2019). Our findings add new evidence of the importance of parental involvement for the formation of self-control during the years from early to mid-to-late adolescence.

Finally, our findings suggested that prosocial behavior and internalizing problems positively influence each other from early to mid-to-late adolescence. To date, prior research suggested a contrary association, with reciprocal negative influences (e.g., Stotsky et al., 2020). A potential explanation for our counterintuitive finding is that higher levels of prosociality might be accompanied by excessive concerns for others (Hoffman, 2000), resulting in anxiety (Hay & Pawlby, 2003) and depression (O'Connor et al., 2007). On the other hand, anxious individuals might be more prone to employ proactive prosocial conduct to get around in their social situations (Culotta & Goldstein, 2008), and depressed individuals might act prosocially out of empathy-based guilt, which is also linked to altruism toward others (O'Connor et al., 2007). This highlights how, from early to mid-to-late adolescence, prosociality contribution to adjustment is complex and prosocial individuals may not be exempt from mental health difficulties. As a result, adolescent health professionals should consider encouraging a healthy balance between self-interest and concern for others.

Strengths and limitations

Our findings add to the limited literature on the extent to which self-control and parental involvement influence prosociality and internalizing problems from early to mid-to-late adolescence. To our knowledge, this is the first study to simultaneously investigate such longitudinal associations across four waves, while controlling for the bidirectional associations among all the studied variables over time. Study strengths include its longitudinal nature, the use of a large normative sample of adolescents assessed four times between ages 11 and 17, quite low attrition, repeated measures of core constructs across all waves, and targeting positive outcomes (i.e., prosociality) rather than merely adolescents' difficulties (e.g., internalizing problems). In terms of research implications, this study clearly demonstrates the critical importance of using longitudinal data to capture the dynamics occurring between earlier promotive and/or hindering factors and later positive and negative outcomes during the adolescence timeframe. It is clear in our study, in fact, how the concurrent correlations provide an often-confusing picture of the probable causal relationships between the variables involved. As an example, it is sufficient here to underline the positive and reciprocal longitudinal effect between prosociality and internalizing problems, which instead tends to be negative in concurrent correlations.

However, limitations of this study should be noted. First, the study was based on a sample of young people growing up in Zurich, an affluent city with a multicultural population largely influenced by individualistic Western European values relating to adolescence and parenting. It is hence unclear to what extent findings can be generalized to other contexts, cultures, and immigration status (Vazsonyi et al., 2006). For example, the role and importance of parental involvement during adolescence may vary across societies and this might impact on the association of parental involvement with both self-control and prosociality. Future studies should therefore take into account this source of variability. Second, all measures in this study were based on survey-based self-reports by adolescents and results may have been influenced by the

same informant bias. Also, the measure of parental involvement used in this study did not allow to separately examine the involvement of fathers, mothers, or other caregiver figures involved in parenting. Future studies may use multi-informant or multi-method approaches and separately examine the involvement of different caregivers. In particular, parental involvement could be assessed in future studies using designs that include both parents as informants and/or observation measures. Third, the data collection intervals of two years may be too long to fully capture the causal mechanisms at play (e.g., Nägel and Nivette, 2022), many of which may be short-term. It would hence be important to develop studies that employ methods such as experience sampling to assess change in, e.g., parenting, adolescent self-control, and prosocial behavior at the level of daily activities and routines. This would allow a much-needed better integration of research on short and long-term causal mechanisms (Eisner & Malti, 2015). Fourth, our use of cross-lagged panel model to analyze the data might raise some concerns in being confident about the resulting cross-lagged effects, as some authors suggest (see Muthén & Asparouhov, 2023). For instance, cross-lagged effects can vary depending on the included covariates, initial data cleaning, and the use of no random versus random intercept models, leaving ample room for potential biased effects. Future research should consider combining the usual cross-lagged panel approach with more reliable models, such as the dynamic panel models (see Lucas, 2023).

Conclusions

This study aimed to examine whether change in self-control and parental involvement prospectively predict change in prosocial behavior and internalizing symptoms between ages 11 and 17, using a large sample of adolescents assessed in four waves. Our findings highlight the important role of parental involvement as a resource that may promote prosociality and self-control during adolescence. These results may have implications for practice. Specifically, they

suggest that interventions aimed at promoting positive parental involvement with their adolescent children may contribute to later adolescent prosociality and self-control. At the same time, our findings also suggest that high prosociality is developmentally positively associated with higher internalizing problems and vice versa. Health professionals should consider encouraging a healthy balance between self-interest and concern for others.

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Table 1
Means and Standard Deviations of Study Variables over Time

Dimension	Time 1		Time 2		Time 3		Time 4	
	M	SD	M	SD	M	SD	M	SD
Self-control	3.16	0.52	2.93	0.52	2.88	0.48	2.93	0.48
Parental involvement	3.34	0.46	3.08	0.59	3.01	0.62	2.96	0.63
Prosociality	3.74	0.68	3.56	0.69	3.60	0.63	3.74	0.63
Internalizing problems	2.04	0.66	2.19	0.73	2.33	0.78	2.41	0.81

Table 2
Correlations Among Study Variables over Time

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. T1_Self-control	1															
2. T1_Parental involvement	.14***	1														
3. T1_Prosociality	.27***	.33***	1													
4. T1_Internalizing problems	-.18***	-.05	.06	1												
5. T2_Self-control	.40***	.12***	.18***	-.06*	1											
6. T2_Parental involvement	.09**	.53***	.19***	-.01	.24***	1										
7. T2_Prosociality	.20***	.23***	.42***	.09**	.21***	.30***	1									
8. T2_Internalizing problems	-.05	.01	.08*	.39***	-.20***	-.09**	.16***	1								
9. T3_Self-control	.32***	.12***	.16***	-.04	.48***	.18***	.14***	-.11***	1							
10. T3_Parental involvement	.10**	.45***	.16***	-.05	.16***	.61***	.23***	-.10***	.23***	1						
11. T3_Prosociality	.11***	.15***	.37***	.10**	.13***	.18***	.56***	.12***	.16***	.24***	1					
12. T3_Internalizing problems	-.01	.03	.14***	.33***	-.10***	-.07*	.14***	.55***	-.16***	-.18***	.18***	1				
13. T4_Self-control	.28***	.09**	.10**	.03	.37***	.13***	.10***	-.08**	.57***	.20***	.14***	-.09**	1			
14. T4_Parental involvement	.12***	.40***	.18***	-.04	.13***	.51***	.19***	-.08**	.16***	.65***	.19***	-.14***	.23***	1		
15. T4_Prosociality	.13***	.14***	.37***	.06*	.10***	.14***	.43***	.10***	.12***	.18***	.60***	.17***	.17***	.22***	1	
16. T4_Internalizing problems	-.03	.02	.12***	.25***	-.10**	-.04	.17***	.46***	-.13***	-.11***	.17***	.61***	-.13***	-.16***	.23***	1

Note. T = Time. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1

Significant standardized results of the cross-lagged model with latent variables linking self-control and parental involvement to prosociality and internalizing problems. Because the model with time-invariant coefficients was held as the final one, for sake of clarity we reported average standardized factor loadings over the four-time intervals as well as T2-T4 average standardized within-time correlations. *p < .05. **p < .01. ***p < .001.

