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Impact of self-control on individual income: evidence from China

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ABSTRACT

This article examines the relationship between individual income and self-control by employing the data available from the China Labor-force Dynamics Survey 2014. We use the two-stage least square method (2SLS) and mediating/moderating effects to estimate the relationship between income and self-control. Results show that self-control impacts individual income both positively and significantly. Age and gender play moderate roles, while education plays a mediating role in the progress of self-control to impact individual income. Robustness analyses are conducted using an IV-quantile regression model, a plausible exogenous instrument, and combining different categories. Findings are consistent across different models and assumptions. This study indicates that an improvement in individual self-control is conducive to increasing individual income.

1. Introduction

There are many temptations in the world. Daily life is full of temptations and impulses that challenge individual self-control (Ahn et al., 2020; Clinton et al., 2020). Self-control mainly refers to the ability of an individual to overcome impulses, habits, or automatic reactions and to consciously control their behaviour (Thaler & Shefrin, 1981). Lack of self-control may lead to unfortunate outcomes such as overspending, procrastination, drug abuse, corruption, and criminal activities (Baumeister et al., 2007; Bernheim et al., 2015; Fudenberg & Levine, 2006, 2012; Genicot & Ray, 2017). However, the relationship between self-control and individual income has yet to be thoroughly understood. If lack of self-control leads to some imprudent results, it is also likely to lead to low income and poverty.

The primary purpose of this article is to empirically estimate the relationship between individual self-control and income by using a representative Chinese dataset

and put forward a dimension of understanding poverty based on self-control. We adhere to the combination of theory and empirical methods to explore the relationship between individual self-control and income. Specifically, our research strategy is to first establish the theoretical fact that income is related to self-control, and then second, to empirically study the relationship between income and self-control. In the part of empirical analysis, to address the endogenous problem of reverse causality between self-control and income, we use an instrumental variable (IV), the average level of self-control of the other respondents in the same living community.

2. Literature review

The topic of self-control can be traced back to the philosophical study of the ancient Greeks (Gosling, 2002). Socrates and Aristotle discussed whether the will or self-control had weaknesses (Gosling, 2002). However, psychology takes the lead in systematic research on the phenomenon of self-control (Baumeister et al., 1994; Muraven & Baumeister, 2000). Successful self-control can produce many good results that are positively looked upon by society. These results include, but are not limited to, a healthy body and mind, academic achievements, the ability to deal with problems met in daily life, the reduction of drug abuse, friendly interpersonal relationships, and a decline in crime rates. Failures in self-control may directly or indirectly lead to unhappy results, such as eating disorders, obesity, drug abuse, violent crime, and sexually transmitted diseases (Arneklev et al., 1993; Baler & Volkow, 2006; Giovanni & Matthew, 2007; Gu, 2020; Gul & Pesendorfer, 2001; Hofmann et al., 2014; Kahn et al., 2015; Laibson, 1997; Lei et al., 2020; Li et al., 2021; Schilbach, 2019; Shapiro, 2005; Stutzer, 2007; Tangney et al., 2004; Turanovic et al., 2015).

Economics also pays attention to the topic of self-control (Castro-González et al., 2020; Shkvarchuk & Slav'yuk, 2019; Thaler & Shefrin, 1981); researchers have focused on the relationship between individuals' self-control and their financial standing (Gathergood, 2012; Howlett et al., 2008). The relationship between individual self-control and individual financial standing is often described as a relationship of positive correlation, viz., the stronger the self-control, the better the financial position (Gathergood, 2012; Howlett et al., 2008; Moffitt et al., 2011; Thaler & Shefrin, 1981). Thaler and Shefrin (1981) finds that high-income athletes who hired brokers to manage their wealth were able to stay wealthy for a long time, compared with those who went bankrupt at their discretion. Broker's management of wealth weakens athletes' impulse to spend and forces the behaviours of athletes to be objectively more rational. Howlett et al. (2008) find that individuals with strong self-control are more rational in pension investment and management. Gathergood (2012) finds that individuals with weak self-control are more likely to have income shocks, credit withdrawals, and unplanned expenditures. Among the influencing factors of financial risk, self-control is more important than financial knowledge (Jones & Mahajan, 2015). Based on the above findings, Ben-David and Bos (2017) suggest that limiting the availability of temptation can improve the financial wellbeing of individuals with inconsistent time preferences, viz., consuming more in the present than planned in the past.

The relationship between self-control and personal financial status is closely related to poverty (Bernheim et al., 1999; 2015; Dalton et al., 2016; Hope & Chapple, 2004; Spears, 2011; Vohs, 2013). Haushofer and Fehr (2014) find that poverty is significantly correlated with psychological factors. Individuals with weak self-control are more likely to experience financial difficulties and fall into poverty. Bernheim et al. (2015) prove theoretically that low initial assets can limit self-control, trapping people in poverty, while individuals with high initial assets can accumulate indefinitely. Bernheim et al. (1999) argue that as credit becomes more accessible, self-control becomes easier to enforce, thus helping to prevent individuals from falling into the low-income poverty trap. Vohs (2013) finds that, on average, the poor have a lower level of self-control. Hope and Chapple (2004) demonstrate that those who had never lived in poverty had higher levels of self-control. Dupas and Robinson (2013) propose that the poor are less able to save. The above studies imply a causal, cumulative, and cyclical relationship between self-control and income or poverty.

The existing studies provide a clear role of self-control in the development, success, and happiness of individuals and the civilization and progress of society. However, there are limited studies on the relationship between self-control and income which runs parallel to personal financial status and poverty. Cobb-Clark et al. (2019) have found that wages are directly proportional to individual self-control when they used German data to discuss the relationship between self-control and some life outcomes. We expand the wage to the total income of an individual, including wage income, property income, operating income, and transfer income, to explore the relationship between self-control and the total income of an individual in 2013 by using national-level data from China.

3. Two mechanisms of self-control affecting income

3.1. Two-stage model of self-control and income

Self-control is the ability to resist short-term temptation and pursue long-term goals. Myrseth and Fishbach (2009) propose a two-stage model of self-control to explain the mechanism of successful self-control. According to the model, successful self-control depends on two stages of psychological and behavioural responses to temptation. The first stage is to identify conflicts related to self-control, and the second stage is to adopt effective self-control strategies. Specifically, when confronted with temptation, an individual should first confirm a conflict between the current temptation and the pursuit of a higher level of long-term goals. If the individual is aware of the conflict between the two, they will adopt a self-control strategy to promote higher-level goals rather than indulge in the present temptation. On the contrary, if an individual fails to identify the conflict between the current temptation and the pursuit of a higher level of long-term goals, they may fall into the present temptation and fail to achieve successful self-control. Further, even if the individual recognizes the existence of conflict between the current temptation and the long-term goal but cannot adopt an effective self-control strategy in the second stage, self-control will also fail. Therefore, only when an individual successfully identifies conflicts between the current temptation and the long-term goal in the first stage of self-control and adopts effective self-
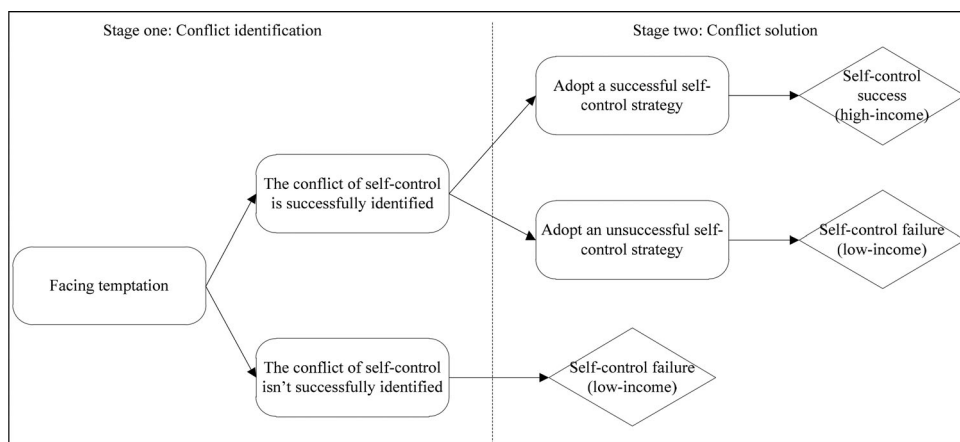
**Figure 1.** The two-stage model of self-control and income.
Source: Adapted from Myrseth and Fishbach (2009).

control strategies in the second stage of self-control can the individual achieve self-control.

In economic behaviour and economic affairs, there are inevitable conflicts of self-control between current over-consumption and long-term savings and investment, between current enjoyment and long-term efforts to achieve entrepreneurial success, career advancement, and pay raise (Barauskaite et al., 2018; Bogg et al., 2012). According to the two-stage model of self-control, when an individual is confronted with these conflicts, it is necessary to identify them first. If an individual is not aware of the existence of these conflicts, the self-control mechanism will not work. The individual is likely to lose himself in short-term happiness, lose the opportunity to work hard and increase their income, and self-control will have ended in failure in the first stage. If the individual recognizes the conflict between short-term temptation and long-term goals in economic behaviour and economic affairs in the first stage of self-control, then self-control enters the second stage, and the individual will adopt strategies to deal with these conflicts. If the individual adopts effective strategies at the second stage, they may make rational choices between excessive current consumption and long-term savings and investment behaviour, between present hedonism and long-term hard work, and successfully achieve self-control. The result is increasing income. Otherwise, the income is reduced (Figure 1).

3.2. Dual-systems model of self-control and income

When confronted with temptation, an individual faces two hostile forces (Hofmann et al., 2009). One is the self-control power that calls for individuals to behave reasonably. The other is the impulse power that encourages the individual to act as they desire. The effects of these two forces should be considered simultaneously if the results of self-control are to be accurately predicted. Based on this understanding, Hofmann et al. (2009) proposed a dual-systems model of self-control. The authors argue that a complete self-control model consists of two systems. The first system is the impulse system, which is the cause of impulsive behaviour. When faced with the
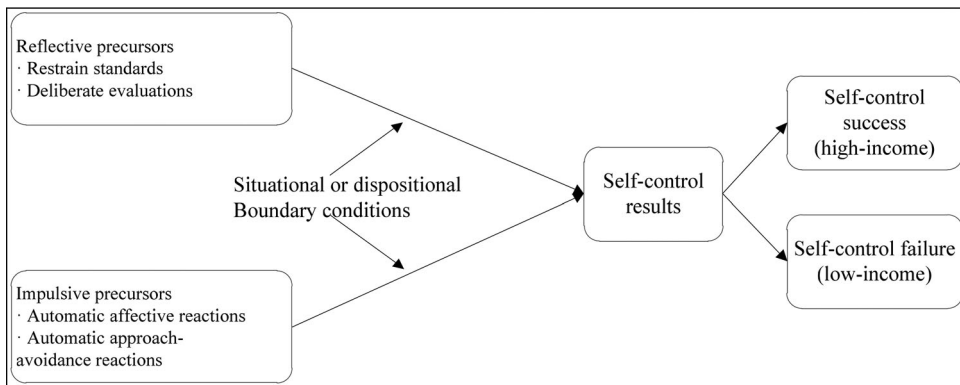
Figure 2. The dual-systems model of self-control and income.
Source: Adapted from Hofmann et al. (2009).

temptation, the individual will automatically take a corresponding impulsive behaviour, including positive hedonic evaluation due to the stimulation of temptation, and the behaviour schema close to the temptation, viz., automatic affective reactions and automatic approach-avoidance reactions. The second system is the self-control system, which is the cause of producing higher psychological activities when faced with temptation. It includes deliberate evaluations and restrained standards. These two systems generate control results by situational or dispositional boundary conditions. If the self-control system triumphs over the impulsive system, the individual self-control succeeds. Otherwise, individual self-control fails.

When faced with potential opportunities for economic benefits, the impulse system of individual self-control will naturally choose to give up based on present hedonism. After all, it will cost a lot to convert potential economic benefits into tangible benefits, including replacing present hedonism. A general rule of evidence is that the poor tend to hold low expectations for the future because they are more constrained than the rich in the process of changing the status quo (Banerjee & Duflo, 2011). They have inconsistent time preferences in choosing the future and the present, and tend to pursue indulgences, thinking such thoughts as 'enjoy while one can' or 'today's wine I drink today.' On the contrary, the individual self-control system will make rational behavioural choices to transform potential economic benefit opportunities into tangible economic benefits through careful evaluation under the criteria of trade-offs (Ericson & Laibson, 2018). Therefore, if the self-control system wins over the impulse system, the individual will implement actions to translate potential economic benefits into reality in terms of income, which means income increases. Conversely, if the impulse system defeats the self-control system, an individual will choose to give up the opportunity to pursue potential benefits. In terms of income, this means that income decreases (Figure 2).

In summary, both the above models imply that a strong self-control ability and successful self-control action means resisting temptation and achieving success. In economic affairs, an individual who has strong self-control is more likely to earn a higher income.

4. Materials and methods

4.1. Data

This article uses data from the China Labor-force Dynamics Survey 2014 (CLDS2014), conducted by the Social Science Research Center of Sun Yat-sen University in China. CLDS2014 is an interdisciplinary survey covering many topics, such as education, work, migration, health, social participation, economic activities, and grassroots organizations. To ensure national representation, CLDS2014's samples 29 out of 34 provincial administrative units of China. It is publicly accessible data that all researchers can use with permission. After removing some outlier values, the final number of observations used in this analysis is 13,089. In the robustness test, the alternative dataset, the China Labor-force Dynamics Survey 2016 (CLDS2016) is used to ensure the reliability of the conclusions drawn. The number of observations in CLDS2016 is 13,227.

4.2. Self-control measurement

We use a proxy variable to measure self-control based on an individual's response to the following three statements:

1. Even if my body is a little uncomfortable, or if there are other reasons to rest, I try to do what I should do every day, including all jobs, studies, and daily life,
2. Even if it is something I do not like to do but need to do, I try my best to do it, and
3. Even if it takes me a long time to get something done, I try my best to do it.

The three statements examined the attitude between self-control/persistence and temporary enjoyment/impulsiveness. Specifically, for the first statement, when a person's body has some discomfort, lying down to rest can be said to be a natural choice. Similarly, it can be interpreted as a temptation to stop working, studying, and living a normal life. Whether an individual can resist this temptation and continue working, studying, and doing other daily chores reflects their level of self-control (Troll et al., 2021).

For the second statement, everyone has a preference for doing something or sitting idle. However, preference cannot replace responsibility. Although we may not like to do something, we should do it where our duty lies. It is a temptation not to do what we do not want to do but what our duties require. Whether an individual can resist this temptation and insist on doing what they do not like but are required by their duty reflects their level of self-control (Zhi et al., 2020).

For the third statement, almost all success must be sustained for a long time. Success requires long-term persistence, and untimely enjoyment is undoubtedly a temptation. Whether an individual can resist the temptation of instant gratification and persist in doing something until success reflects self-control (Kokkoris & Stavrova, 2021). Therefore, the above three statements can help to identify and measure self-control.

The responses to these statements were asked in a polychotomous format, with '1' being strongly disagree and '3' being strongly agree. The results of the validity test show that the minimum polychoric correlation value among these three statements is 0.6415. It means that there is a higher correlation between the answers to the three questions, and the validity of the questionnaire for measuring self-control is good.

We estimated the individual self-control level by calculating the average of the responses to the three statements. We round up or round down numbers to reach the mean value of individual self-control. Ultimately, there are three levels of self-control, respectively, numbered from '1' to '3', representing weak, normal, and strong self-control ability. We treat the self-control score as a continuous variable (Ferrer-i-Carbonell & Frijters, 2004).

4.3. Model construction

The explanatory variable of interest in this article is self-control. We focus on the effect of individual self-control on income. The econometric model used in this article is as follows:

$$W_i = \alpha_0 + \alpha_1 SC_i + \beta X + \varepsilon_i \tag{1}$$

In Eq. (1), W is the natural logarithm of the annual income of the individual surveyed. α_0 is constant. SC stands for the self-control value of the respondents. α_1 means the marginal contribution of self-control level on income. X is a matrix of other control variables that may affect individual income, viz., gender, age, age square, health, education, knowing foreign languages or not, having occupational qualification certificates or not, nature of household registration (*hukou* in Chinese) at birth, political status, number of acquaintances, nature of the working industry, and region where the respondent is located (Ballew et al., 2020; Chu & Hoang, 2020; Lu et al., 2020; Luo & Xie, 2020). Variable definitions are presented in detail in Table 1. β is a vector of marginal contributions of other control variables on individual income. ε is the error term, and i denotes individual.

We suspect there may be an endogeneity concern caused by reverse causality between self-control and income. Hope and Chapple (2004) have shown that self-control is significantly correlated with poverty. They find that those who have never experienced poverty have better self-control than those who have experienced poverty. A low level of initial assets can limit self-control and make people fall into the poverty trap (Bernheim et al., 2015). These research findings indicate that economic conditions may affect individual self-control ability, which in turn affects income.

Another endogeneity issue is hidden bias due to unobservable or unobserved characteristics associated with the explanatory and dependent variables. For instance, the environment individual grew up in is a typical potential confounder. The environment individual grew up in could not be measured precisely, while it could positively correlate with individual self-control and affect individual income through education attainments. If individuals have grown up in an environment with harmony and free from violence, they are more likely to keep away from temptation and have better self-control (Agbaria & Natur, 2018). Likewise, their parents are more likely to invest

Table 1. Definition of variables and descriptive statistics.

Variable	Definition	Mean	SD	Min	Max
Income	Annual income of respondent in 2013 (yuan)	33500.4	89313.3	100	5930000
Self-control	Self-control ability, = 1 if weak, = 2 if normal, and = 3 if strong	1.927	0.455	1	3
Male	= 1 if gender is male	0.551		0	1
Age	Years	46.846	11.768	18	70
Poor health	= 1 if poor health	0.359		0	1
Fair health	= 1 if fair health	0.420		0	1
Good health	= 1 if good health	0.220		0	1
Education	Years of schooling education of respondent	8.903	4.375	0	23
Foreign language	= 1 if knowing one or more foreign languages	0.121		0	1
Skill	= 1 if has one or more occupational qualification certificates	0.154		0	1
Household registration	= 1 if a respondent had non-agricultural household registration at birth	0.177		0	1
Member of CPC	= 1 if respondent is the member of the Communist Party of China (CPC)	0.097		0	1
Acquaintance	The number of acquaintances of respondent	13.923	43.513	0	1000
Working industry	The working industry of respondent	—	—	—	—
Region	Respondent's province	—	—	—	—

Source: created by authors.

in children's education to make children have a high-earning work and bright future (Doepke et al., 2019). Therefore, omitting the environment in which individuals grew up is likely to bias the coefficient of a variable, although we have controlled for some demographic characteristics, human capital characteristics, and social capital characteristics.

A common approach to deal with the endogeneity issues is to use the instrumental variable (IV) method. Therefore, we use the IV method to overcome the issues related to endogeneity. We use an average level of self-control of the other respondents in the same living community as an instrument for the self-control variable.

According to the peer effect (Buechel et al., 2018), individuals in the same living community interact in many aspects, including their ability to self-control. Therefore, the average level of self-control of the other respondents in the same living community may affect individual self-control. However, the average level of self-control of the other respondents in the same community is unlikely to directly affect the individual's income. As a structured and highly disciplined society, self-selected behaviour in residential communities in China is insignificant (Zhao & Yu, 2020). With a few exceptions, almost every community is inhabited by the rich and the poor, i.e., they are not segregated (Chauvin et al., 2017). Nonsegregated community is a remarkable feature of Chinese society. Therefore, we believe that the average level of self-control of the other respondents in the same living community is a good IV. It is common to use the average of samples in a particular range as an IV. Fisman and Svensson (2007) use this approach to study the relationship between corruption, taxation, and

economic growth. A similar approach is used in Grootaert et al. (2002) and Sabia (2007). Also, we test the robustness of our instrument by using Conley et al. (2012) plausibly exogenous estimation method (Table 6).

$$\text{The second stage:} \quad W_i = \lambda_0 + \lambda_1 SC + \beta_1 X + \mu_i \tag{2}$$

$$\text{The first stage:} \quad SC_i = \lambda_0 + \lambda_2 Z + \beta_2 X + \xi_i \tag{3}$$

In Eqs. (2) and (3), λ_0 is constant; W is the natural logarithm of the annual income of the individual surveyed; SC is the endogenous variable, the self-control value of the respondents; X is a matrix of other control variables that may affect individual income; μ and ξ are the error terms. In particular, Z represents the instrumental variable, viz., the average level of self-control of the other respondents $(n_c - 1)$ in the same living community. λ_1 is the coefficient that we are most interested.

Further, we discuss the moderating effects of age and gender on the impact of self-control on income. Specifically, we test respectively for the influences of age and gender on the relationship between self-control and income to explore if age and gender can help strengthen or weaken the nature of the relationship between self-control and income. We also discuss the mediating effect of education on the impact of self-control on income to describe the process through which the effect of self-control on income occurs.

As age increases, the self-control ability of individuals as impacted by their social networks becomes stronger (Bornstein et al., 2017). Generally, people are more willing to work and cooperate with people with strong self-control abilities than people with weak self-control (Martinsson et al., 2014). In this way, people with strong self-control will probably obtain better interpersonal relationships and thus more income opportunities. Employers cannot observe non-cognitive traits at the beginning when an employee is hired but observe these traits throughout the employee's career (Alós-Ferrer & Prat, 2012). As an employee stays in a job position longer, employers have a chance to evaluate their self-control level more carefully. An employee with strong self-control remains employed continually and receives higher pay with experience.

For gender, there is a tradition of 'the woman stays at home and the man earns money by working outside' in China (Lazar & Sun, 2020). Generally, as high self-control ability can bring high efficiency, people tend to work and communicate with people who have strong self-control abilities (Martinsson et al., 2014). Therefore, men who work outside the home need to rely more on self-control to increase their income compared with women at home.

Previous studies have shown that higher self-control increases education achievements (Cobb-Clark et al., 2019; Duckworth et al., 2010). The stronger the individual's self-control ability, generally, the more perseverance to participate in continuous learning and income generation.
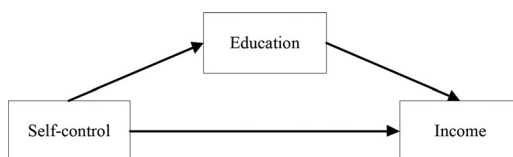
We describe the functioning of moderating and mediating effects in Figures 3 and 4. The equations for calculating the mediating effect of education are as follows:

$$W_i = \alpha_2 + \alpha_3 SC_i + \gamma_i \tag{4}$$
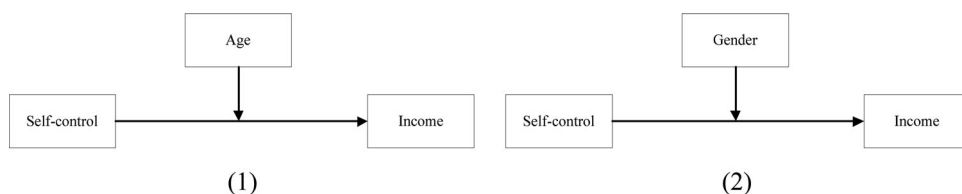
Figure 3. Moderating effect of age and gender on the impact of self-control on income.
Source: created by authors.

Figure 4. Mediating effect of education on the impact of self-control on income.
Source: created by authors.

$$education_i = \alpha_4 + \alpha_5 SC_i + \delta_i \tag{5}$$

$$W_i = \alpha_6 + \alpha_7 education_i + \epsilon_i \tag{6}$$

$$W_i = \alpha_8 + \alpha_9 SC_i + \alpha_{10} education_i + \varsigma_i \tag{7}$$

Combining Eq. (5) into Eq. (7), we can get the following:

$$W_i = \alpha_{11} + (\alpha_9 + \alpha_5\alpha_{10})SC_i + \vartheta_i \tag{8}$$

Coefficient $\alpha_5\alpha_{10}$ is the influence of self-control on income through education, which is, mediating effect. Coefficient α_3 is the total effect of self-control on income.

5. Results

5.1. Descriptive statistics

Table 1 shows the descriptive statistics of the data used in this study. For the dependent variable, the average yearly income in 2013 of the samples is 33500.4 yuan.[1] For the explanatory variable, the mean value of self-control of the samples is 1.927, which shows an average respondent has slightly lower self-control abilities. For the control variables, out of the total 13,089 samples, males account for 55.1%. The average age of the samples is 46.846 years old. The health status of 22% of the sample is good, 42% is fair, and 35.9% is poor. The respondents' average number of years of schooling is 8.903 years. In our sample, 12.1% of individuals know at least one foreign language and 15.4% have an occupational qualification certificate. A substantial number of people (82.3%) have rural hukou registration at birth. Before the reform and opening of China in 1978, most Chinese lived in the countryside and their household registrations at birth were agricultural household registration (Zhang et al., 2020), so
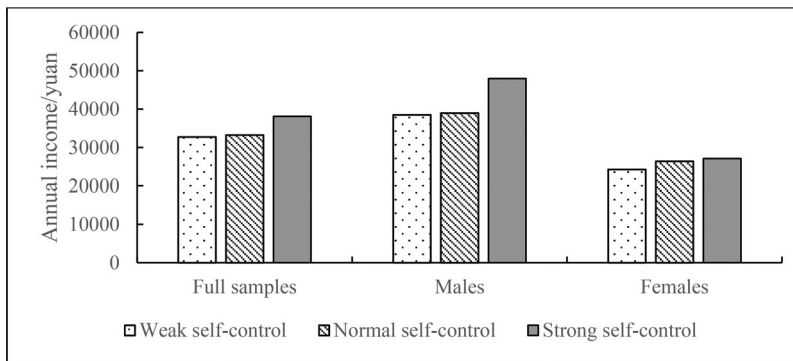
Figure 5. Average annual income of individuals with different levels of self-control.
Source: created by authors.

Table 2. Impact of self-control on income.

Variables	(1) OLS	(2) OLS	(3) IV-2SLS	(4) IV-2SLS	(5) IV-2SLS
Self-control	0.0648***	0.0476**	0.4272***	0.2835**	0.2732***
	(0.0239)	(0.0225)	(0.1491)	(0.1319)	(0.0525)
Male		0.3674***		0.3764***	0.3760***
		(0.0200)		(0.0207)	(0.0176)
Age		−0.0072***		−0.0075***	−0.0075***
		(0.0014)		(0.0014)	(0.0009)
Age square		−0.0013***		−0.0012***	−0.0012***
		(0.0001)		(0.0001)	(0.0001)
Fair health		0.1960***		0.1982***	0.1981***
		(0.0278)		(0.0278)	(0.0191)
Good health		0.2883***		0.2765***	0.2770***
		(0.0336)		(0.0343)	(0.0225)
Education		0.0450***		0.0442***	0.0442***
		(0.0052)		(0.0052)	(0.0029)
Foreign language		0.0705**		0.0656**	0.0658**
		(0.0312)		(0.0321)	(0.0261)
Skill		0.1408***		0.1329***	0.1332***
		(0.0251)		(0.0255)	(0.0221)
Household registration		0.1253***		0.1250***	0.1250***
		(0.0344)		(0.0350)	(0.0219)
Member of CPC		0.0965***		0.0906***	0.0908***
		(0.0282)		(0.0283)	(0.0274)
Acquaintance		0.0002		0.0002	0.0002
		(0.0003)		(0.0003)	(0.0002)
Work industry	YES	YES	YES	YES	YES
Region	YES	YES	YES	YES	YES
Constant	8.8031***	8.7870***	8.1080***	8.3500***	8.3693***
	(0.0839)	(0.1329)	(0.2987)	(0.2833)	(0.1128)
R-squared	0.2912	0.3968	0.2715	0.3885	0.3892

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.
Source: created by authors.

this percentage of respondents with rural hukou at birth makes sense. There are 9.7% of respondents who are a member of the CPC.

Figure 5 shows the relationship between self-control and average income in the whole, male-only, and female-only samples. It can be observed that, as self-control value increases, the average values of the annual income of whole, male-only, and female-only samples increase gradually.

5.2. Benchmark regression results

We estimate Eq. (1) using the OLS regression method, and the results are presented in Table 2. Column (1) in Table 2 shows that the coefficient of the self-control variable is statistically significant ($p < 0.01$), which indicates that individuals with stronger self-control are more likely to have a higher income after controlling industrial effects and regional effects. Column (2) shows that the self-control variable still shows a statistically significant and positive influence on income after controlling for industry, region, and individual effects.

5.3. Addressing endogeneity

We address the potential endogeneity concern of the self-control variable in this section. As explained in the method section, the average level of self-control of the other respondents in the same living community is selected as an IV for individual self-control.

The coefficient of the instrumental variable in the first stage regression model is highly significant ($p < 0.01$), which means the IV satisfies the relevancy criterion. The inclusion of SC and Z as explanatory variables in Eq. (2) shows that the coefficient of Z (instrumental variable) is not significant, indicating that the exclusion criterion is satisfied. The value of Kleibergen-Paap rk LM statistic is 742.984 ($p < 0.01$). The value of Cragg-Donald Wald F-statistic is 1546.498, and the value of Kleibergen-Paap rk Wald F statistic is 1144.957. They are both far greater than the Stock-Yogo weak IV test critical value 16.38 at the 10% maximal IV size (Stock & Yogo, 2005). It means that there is no problem with weak identification. These test statistics justify the instrumental variable chosen in this study is valid.

The impact of individual self-control on income using the average level of self-control of the other respondents in the same living community as the IV for individual self-control is reported in column (3) to column (4) of Table 2. It can be observed from column (4) of Table 2 that individual self-control still has a statistically significant and positive impact on individual income ($p < 0.05$) after controlling for endogeneity.

We added adolescent self-control as an additional instrument variable. Research shows that the early self-control of individuals has a significant impact on the self-control of adults (Turner & Piquero, 2002). The measurement of self-control in adolescence is the same as used in adulthood, taking three values of 1 to 3 increasing in strength positively. Notably, adolescent self-control has no significant effect on individual income, although it has a significant effect on the individual self-control of adults. The coefficient of self-control of adults still has little change, and the instrument is still significantly positive. These results indicate that adolescent self-control affects the self-control of adults but does not affect individual income. Thereby, adolescent self-control is not the potential channel through which the instrument affects individual income.

Next, we conduct the overidentification test. The results in column (5) of Table 2 show that the coefficient of self-control of adults is 0.2732, which is very close to the baseline IV results (0.2835) in column (4) of Table 2. In particular, the value of test
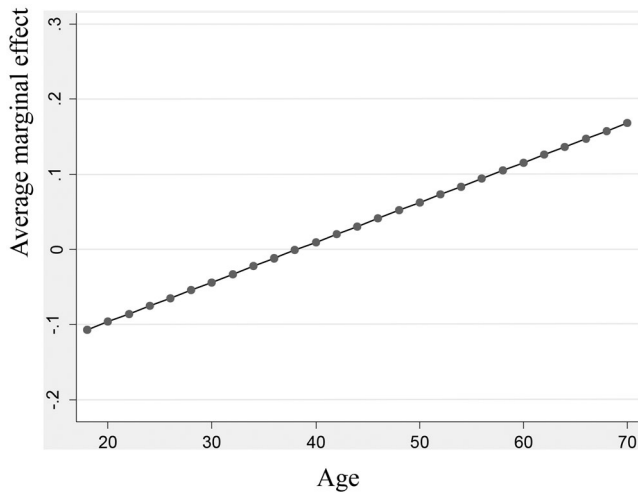
Figure 6. The average marginal effect of self-control on income with different age.
Source: created by authors.
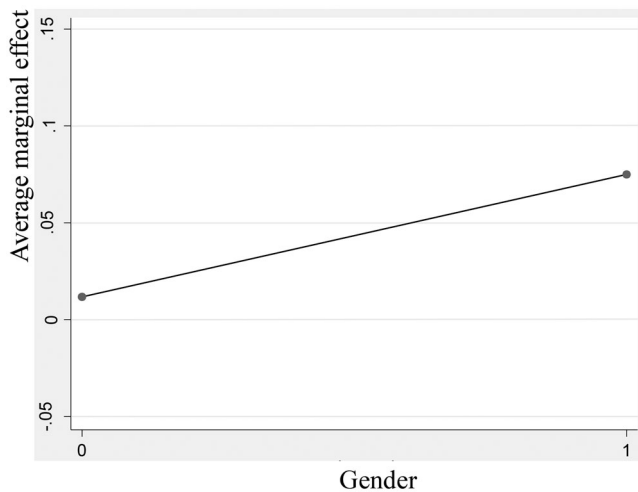
Figure 7. Average marginal effect of self-control on income for males and females.
Note: On the x-axis, 0 represents women, and 1 represents men.
Source: created by authors.

of overidentifying restrictions is 0.3427 ($p = 0.5583$), suggesting that we cannot reject the null hypothesis, i.e., all instruments are exogenous. Thus, the results are robust in terms of the instrument.

5.4. Exploring the impact mechanism of self-control on income

Figure 6 shows the average marginal effects of self-control on the income of individuals with different ages. The results show that the average marginal effect of individual self-control on income increases with the increase in individual age. It indicates that age is an important moderator mechanism of individual self-control on income. The

impact of self-control on income increases with age but declines after a certain point, as indicated by the significant negative coefficient of the age square term. Figure 7 shows the average marginal effects of self-control on the income of males and females. The results show that the average marginal effects of male self-control on income are bigger than that of females. Results also indicate that compared to females, males' income is more susceptible to self-control.

Table 3 reports the mediating effect of education on the relationship between self-control and income. It can be observed that education plays a significant mediating role in the impact of self-control on income ($p < 0.05$). Therefore, it can be concluded that education is an effective mediating path for self-control impacting income.

5.5. Robustness test

5.5.1. IV-Quantile regression

OLS/2SLS regression results reflect the impact of self-control on income on an average level. However, the impact of self-control at different income levels may be different (Koenker & Bassett, 1978). To check the impact of individual self-control on income with different income levels, we run an IV-quantile regression model, the result of which is presented in Table 4. We select the quantiles shown to illustrate the relationships for individuals at various points along the conditional distribution, with results shown for the 10th, 25th, 50th, 75th, and 90th conditional quantiles. We define the income level at the 10th conditional quantiles as poverty, 25th as relative poverty, 50th as medium income, 75th as higher income, and 90th as the highest income. Although income does not fully represent wealth, it is a close indicator of wealth and poverty (Gustafsson & Sai, 2020; Iceland & Bauman, 2007).

Table 4 shows that there is a heterogeneous impact of self-control at different income levels. The significance of the self-control coefficient becomes weaker as we move from the 10th to 90th decile. Specifically, at the 10th, 25th, and 50th s percentile, the positive impacts of self-control on income are significant ($p < 0.01$). At the

Table 3. Mediating effect of education in self-control impacting income.

	Education
Indirect effect	0.0067**
	(0.0026)
Direct effect	0.0476***
	(0.0180)

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.
Source: created by authors.

Table 4. IV-quantile regression of impact of self-control on income.

Variables	10th	25th	50th	75th	90th
Self-control	0.250***	0.307***	0.187***	0.160**	0.208**
	(0.096)	(0.074)	(0.067)	(0.074)	(0.095)
Control variables	YES	YES	YES	YES	YES

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.
Source: created by authors.

Table 5. IV-2SLS regression of sub-sample with self-control as classification criterion.

Variables	(1) Self-control = 3 is omitted	(2) Self-control = 1 is omitted
Self-control	0.3875*	0.5498*
	(0.2252)	(0.3155)
Control variables	YES	YES
N	12,169	11,219
R-squared	0.3868	0.3863

Notes: Standard errors in parentheses. * $p < 0.1$.
Source: created by authors.

Table 6. Conley et al. (2012) plausibly exogenous bounds.

Variables	(1) UCI	(2) LTZ
Self-control	(0.1755, 0.3911)	(0.1730, 0.3899)
Control variables	YES	YES

Notes: The estimator of the lower bound and the upper bound for the coefficient of self-control variable is shown in parentheses with a 95% significance level.
Source: created by authors.

75th and 90th percentile, the positive impacts of self-control on income are significant ($p < 0.05$). The coefficient value of the impact of self-control on income is 0.250 at the 10th, 0.307 at the 25th, 0.187 at the 50th, 0.160 at the 75th, and 0.208 at the 90th, respectively. This finding suggests that self-control is more income enhancing for the poor (10th), the relatively poor (25th), and the highest-income (90th) individual, but less income enhancing for the medium- (50th) and higher-income (75th) individuals.

5.5.2. IV-2sls regression of sub-sample with self-control as a dummy variable

It appears that most of the action is in the self-control = 3 group, which shows a substantially higher effect in this group than other categories (Figure 5). In comparison, the income difference between the self-control = 1 and self-control= 2 groups is relatively small. When we omit self-control = 3, we find that the impact of self-control on income is still significant at a 10% level (column (1) in Table 5). Further, when we omit self-control = 1, from column (2) in Table 5, we find that the impact of self-control on income is also significant ($p < 0.1$). It shows that the results of this article are robust.

5.5.3. Relaxing instrument exogeneity

As the second-best way, assuming that the IV failed to satisfy the usual exogeneity condition, we test parameter sensitivity following Conley et al. (2012) plausibly exogenous estimation method. Columns (1) and (2) in Table 6 report the plausibly exogenous estimation results. The bounds on the endogenous variable (i.e., *self-control*) estimated with the UCI method are [0.1755, 0.3911], and the bounds estimated with the LTZ method are [0.1730, 0.3899]. The value of 0.2835, the coefficient of self-control estimated with an exogenous IV, is within the two intervals, which means our results of the instrumental variable estimation are robust.

Table 7. Impact of self-control on income using the CLDS2016 data.

Variables	(1) OLS		(2) IV-2SLS
Self-control	0.0144***		0.7272***
	(0.0053)		(0.1889)
Control variables	YES		YES
R-squared	0.0454		0.3819
N		13,227	

Notes: Standard errors in parentheses. *** $p < 0.01$.
Source: created by authors.

Table 8. Impact of self-control on wage income using data of 2016.

Variables	(1) OLS		(2) IV-2SLS
Self-control	0.0174**		0.8326***
	(0.0073)		(0.1905)
Control variables	YES		YES
R-squared	0.0551		0.2777
Kleibergen-Paap rk LM statistic		169.075	
Cragg-Donald Wald F statistic		240.993	
Kleibergen-Paap rk Wald F statistic		188.651	
N		7,915	

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$.
Source: created by authors.

5.5.4. Replacing data

To ensure the reliability of the estimated results, this article further conducts the alternative dataset (CLDS2016) method for an additional robustness check. The results are presented in Table 7.

Like the results by employing the dataset of the CLDS2014, in the first stage regression by using the CLDS2016, the coefficient of IV is highly significant ($p < 0.01$), which indicates the IV satisfies the relevancy requirement. When the reduced form regression estimated, the insignificant coefficient of IV was found. It is meant the IV satisfies the exclusion restriction criterion. Moreover, the Kleibergen-Paap rk LM statistic value of under-identification test is 431.694 ($p < 0.01$), which rejects the null assumption of the under-identification. It reveals the IV in this article is closely related to the endogenous variable. The Cragg-Donald Wald F-statistic of weak IV identification test is 647.478 (16.38, 10% maximal IV size), and the value of Kleibergen-Paap rk Wald F statistic is 506.485 (16.38, 10% maximal IV size). The two values mean that there is no weak identification issue. The above statistics of IV tests have verified again that the choice of the IV in this study is reasonable.

It can be observed from the OLS regression in Table 7 that after controlling other factors influencing individual income, the coefficient of self-control is 0.0144 ($p < 0.01$). However, after dealing with the endogenous issue, the coefficient of self-control increases to 0.7272 ($p < 0.01$) in the IV-2SLS model. The above results indicate that self-control is significantly and positively associated with income, and the results in present study are stable and robust.

5.5.5. Replacing dependent variable to wage income

We also change the dependent variable to test the robustness of the results in this article. Generally, as wage income is closely associated with individual yearly income, we replace the dependent variable, the average yearly income with individual wage

income (El-Osta et al., 2007). By employing the dataset of the CLDS2016, the results in Table 8 show that when other control variables are controlled, the influence of self-control on individual wage income is significant and positive in OLS (coefficient = 0.0174, $p < 0.05$) and IV-2SLS (coefficient = 0.8326, $p < 0.01$) models. This verifies again that the results of this article are robust. The results of the essential endogeneity tests in Table 8 also indicate that the choice of the IV in this article meets all the criteria.

6. Discussion

With the steady increase in life expectancy worldwide, individuals should pay more attention to their health and wealth to avoid falling into poverty in old age (Oeppen & Vaupel, 2002). Modern society has also seen marked increases in food availability, a sedentary lifestyle, access to harmful addictive substances, ease of divorce, self-management of retirement savings, and imprisonment of lawbreakers. These societal and livelihood changes for worse need self-control not only for individuals' well-being but also for survival (Moffitt et al., 2011).

This article provides a dimension of understanding poverty from the perspective of individual self-control. Our results show that self-control significantly impacts individual income. The more self-control, the higher the income. At the same time, income is one of the most important indicators to measure poverty. Therefore, the results of this article indicated that if an individual does not want to fall into poverty, it is necessary to improve self-control. Increasing income by improving self-control is a way out of poverty. As far as the government is concerned, when the government formulates anti-poverty policies, those incentive policies conducive to improving the self-control of the poor should be adopted, such as conditional transfer payments.

Based on the findings of this study, we can suggest several ways to improve self-control. First, individuals should set long-term life goals and trade off their short-term pleasure to achieve the long-term goals. Second, since gender is a moderating variable in the impact of self-control on income, and men's income increases are more dependent on self-control, we should pay more attention to improving men's self-control. Third, considering education playing a mediating role in the impact of self-control on individual income, the effect of education in improving self-control should be in the centre. The importance of self-control should be prioritized in the national educational system. In fact, many western countries have included the mindfulness program in the early education program and indicated that the program helped children and adults to gain self-control (Gagne & Nwadinobi, 2018; Parker et al., 2014).

Studying the relationship between income of Chinese and self-control has great social significance to both the general public and the Chinese government. The Chinese government is currently implementing a large-scale poverty alleviation program to help the poor increase income and eliminate absolute poverty. Anti-poverty researchers and field workers have found that some poor people lack or have weak self-control (Hou & Song, 2020). It is difficult for them to complete an economic activity that may increase their income, such as raising chickens or piglets to maturity

for sale. Therefore, exploring the impact of self-control on income has paramount importance for China's poverty alleviation.

There are some caveats associated with this article. First, the variable used to measure self-control can be made more rigorous. Second, collaborations between psychologists and economists may help to identify a better measure of self-control. Third, randomized experiments on self-control and income may be a better approach to identify a true causal impact of self-control on income and poverty.

7. Conclusions

This article examined the relationship between income and self-control by using the data available from the CLDS2014. After controlling endogeneity, the results showed a statistically significant and positive relationship between income and self-control. Age and gender were found to play moderating roles in the impact of self-control on income, and education played a mediating role in the progress of self-control to impact income. IV-quantile regression analysis showed a significant and positive relationship between self-control and income in all quantiles. This study indicated that the improvement of individual self-control is conducive to increasing the income of individuals and helping them get rid of economic poverty, and increase individual and household welfare.

Note

1.   US$1 = 6.46 Chinese yuan (as of 10/11/2021).

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