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Comprehensive sexuality education weakens the effect of in-group bias on trust and fairness

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ABSTRACT

Many studies have confirmed the positive effects of comprehensive sexuality education on the development of children's sexuality, such as the acquisition of sexual health knowledge. However, little is known about the impact of comprehensive sexuality education on children's social development, although several core aspects of the approach stress social concepts such as fairness, respect and equality. This study examined whether comprehensive sexuality education could weaken the effect of in-group bias on social decision-making towards friends and strangers. Compared to the students in a control group, who never received comprehensive sexuality education, we found that students who received six years (72 lessons) of comprehensive sexuality education had a less in-group bias towards strangers regarding trust and fairness as reflected in a trust game, an ultimatum game and a dictator game. These results suggest that comprehensive sexuality education weakened the effect of in-group bias in the experimental group and encouraged egalitarianism in the experimental group's interpersonal cooperation and social decision-making. These findings suggest that comprehensive sexuality education could positively impact children's interpersonal attitudes and contribute to their social development.

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Comprehensive sexuality education; egalitarianism; in-group bias; fairness; trust

Introduction

Comprehensive sexuality education (CSE) is a curriculum-based process that involves teaching and learning about the cognitive, emotional, physical and social aspects of sexuality. It aims to provide children and teenagers with the sexual and interpersonal information, skills and attitudes/values through culturally relevant and age-appropriate methods while providing precise, factual and non-judgemental scientific information (UNESCO 2018). CSE has been used to empower children and teenagers to promote their own health, is widely advocated for in various international declarations, and has been

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implemented in numerous countries (Haberland and Rogow 2015; Liu and Su 2014; Napierala Mavedzenge, Doyle, and Ross 2011). Research has shown that students receiving sexuality education have more comprehensive knowledge and fewer misunderstandings about sexual matters (Caron and Ahlgrim 2012; Johnson et al. 2003; van der Maas and Otte 2008), and demonstrate lower levels of sexual behaviour intention (Donnelly et al. 2016). Furthermore, students' attitudes towards sexual minorities also change, becoming more positive and tolerant following the receipt of sexuality education (Gao and Liang 2006).

Nevertheless, most previous surveys have emphasised the impact of CSE on sex- and sexuality-related issues and have neglected other aspects, particularly its impact on daily social decision-making. Sexual decision-making is one of the numerous social decisions addressed in CSE, and several concepts of CSE inevitably overlap or contradict students' moral education. As an educational method, CSE involves more than teaching sexual information; in addition to aiming to change attitudes towards specific human sexual behaviours, it also aims to create a general openness and respect for the full range of related social decisions (Svanemyr et al. 2015). For instance, CSE curricula often include a reference to interaction with sexual minorities, people with disabilities, women and other marginalised groups, emphasising that 'all people should be respected no matter what their gender, age, sexual orientation, race, health situation, and nationality are'. They also encourage students to adopt ideals of egalitarianism within their social circles and to concretely apply these in their communication with individuals belonging to different groups (Liu 2017). This means that the influence of the egalitarianism advocated for by CSE can have a powerful impact, as changes in students' beliefs about specific groups are likely to become generalised to all individuals and may be expected to impact students' daily social decision-making and attitudes. The mechanism through which CSE interacts with daily decision-making is unknown; thus, further research on the influence of CSE on daily social decision-making is required, especially for children of primary-school age, which is regarded as a critical period of social development.

In this study, which focuses on CSE in primary school, egalitarianism is viewed as a pivotal principle that plays an essential role in many domains, such as sexual diversity and gender equality, and impacts children's daily decisions and socialisation processes. Socialising is made possible through initial mutual trust between genetically unrelated individuals and is promoted and maintained by establishing and enforcing specific social norms, including fairness (Buckholtz and Marois 2012). Thus, it is essential to explore the impact of the egalitarianism advocated by CSE on children's initial trust and fairness. During social activities, people tend to show in-group bias, reflected in their inclination to be more positive and helpful towards in-group rather than the outgroup members (Balliet, Wu, and De Dreu 2014; Efferson, Lalive, and Fehr 2008). Specifically, individuals usually express more trust (Hughes, Ambady, and Zaki 2016; Platow et al. 2012; Xin, Xin, and Lin 2016) and fairness (Bechler, Green, and Myerson 2015) towards their conversant friends than towards strangers. As CSE emphasises equality and egalitarianism, we hypothesise that the effect of in-group bias can be weakened when the egalitarianism encouraged by CSE manifests itself in social interactions.

Methods

Participants

Participants consisted of 167 healthy migrant children enrolled in final year of primary school at two schools, with 78 children who had received CSE for six years as the experimental group (age range: 10–15; mean age = 12.40 ± 0.74 ; 43 boys) and 89 children who had never received CSE as the control group (age range: 11–15; mean age = 12.35 ± 0.64 ; 49 boys). Participants in the experimental group and control group were randomly selected from two schools, respectively. The two groups were matched in terms of age, grade, sex and school performance. The two primary schools of the experimental group and the control group were in the same school district with comparable teaching quality, regional economic development level, campus culture and campus atmosphere. Despite the absence of relevant courses in the school of the control group, the two schools exhibited equally positive attitudes towards the implementation of CSE, helping avoid potential bias. All participants and their legal guardians signed informed consent forms and received gifts in the form of stationery, pencils and pens for their participation.

Comprehensive sexuality education (CSE)

A series of 12 textbooks edited by Wenli Liu called *Cherishing Life – Sexuality Education for Primary School Students (Cherishing Life)* laid the foundation for the curriculum content. *Cherishing Life* is based on the *Health Education Guidelines for Primary and Middle School* published by the Ministry of Education (MOE) (2008) in China and the *International Technical Guidance on Sexuality Education* published by UNESCO (2009), translated and adapted for use in the local context. Each textbook is organised around six key concepts: family and friends, life skills, gender and rights, human development, sexuality and healthy behaviour, and sexual and reproductive health (details are presented in Table 1). The goals of the six key concepts and learning objectives are to equip students with the knowledge, attitudes/values and skills that will empower them to realise their health, well-being and dignity; consider the well-being of others impacted by their choices; understand and act upon their rights; and respect others' rights (UNESCO 2018). The CSE programme consisted of six 40-min lessons each semester over six years, totalling 72 lessons.

All teachers received specialised training addressing the six broad concepts, teaching skills, and the key values of CSE. The training activities included lectures, teaching seminars, group lesson planning, activities aimed at reforming values, and discussion of sensitive issues, including questions such as 'What do you think sexual orientation is?', 'Do you think people with disabilities have the right to enjoy sex?', and 'Do you think it is necessary to treat others equally?'

Table 1. Key concepts of sexuality education and main content addressed at each grade level.**Key concept 1: Family and friends**

Grade 1: Loving your family; cherishing your friends

Grade 2: Family is a harbour of love; friendship is golden

Grade 3: Marriage and divorce; tolerance, acceptance and respect

Grade 4: Roles and responsibilities of family members; understanding interpersonal relationships

Grade 5: Friendship and equality; eliminating discrimination

Grade 6: Understanding marriage; raising children

Key concept 2: Life skills

Grade 1: Learning to make decisions; asking for help

Grade 2: Learning to communicate; peer pressure

Grade 3: Understanding yourself and others; learning to negotiate

Grade 4: Listening, expressing, and understanding; asking for help and support

Grade 5: Learning to make the right decisions; learning to say 'no'

Grade 6: Understanding social norms; understanding values

Key concept 3: Gender and rights

Grade 1: Gender; books and growing up

Grade 2: Gender equality; television and growing up

Grade 3: Gender roles; computers, the Internet, and growing up

Grade 4: Child rights; children's sexual rights

Grade 5: Understanding child sexual abuse; preventing and dealing with child sexual abuse

Grade 6: Sexual orientation; sexual information

Key concept 4: Human development

Grade 1: Knowing the human body; cherishing life

Grade 2: Birth; equality and diversity among human beings

Grade 3: Physical changes; adolescence is coming

Grade 4: Physical appearance; physical attention and touch

Grade 5: Structure and function of reproductive organs; menstruation and spermatorrhoea

Grade 6: Adolescent health care; pregnancy

Key concept 5: Sexuality and healthy behaviour

Grade 1: Exploring the body; cultivating good hygiene habits

Grade 2: Understanding physical touch; protecting private parts

Grade 3: Life cycle and sexuality; sexual psychology in adolescence

Grade 4: Sexual desire; sexual fantasies and dreams

Grade 5: Masturbation; love in adolescence

Grade 6: Sexual behaviour; response to sexual stimulation

Key concept 6: Sexual and reproductive health

Grade 1: Caring for your body; caring for your reproductive organs

Grade 2: Health and disease; being healthy

Grade 3: Understanding infectious disease; preventing infectious disease

Grade 4: Understanding sexually transmitted disease; preventing sexually transmitted disease

Grade 5: Understanding HIV and AIDS; preventing HIV transmission

Grade 6: Teenage pregnancy; preventing teenage pregnancy

Measurements**Demographics**

A self-reported questionnaire was used to elicit participants' demographic characteristics, including age, sex, grade, socio-economic status (SES) and school performance (average scores on the participants' final year exams).

CSE questionnaire

The CSE questionnaire addressed 10 dimensions: family and marriage, life skills, rights, self-protection, reproduction organs, hygiene and health, adolescent development, sexual behaviours, HIV and reproduction and contraception. The questionnaire covered the key content of CSE and was used to test students' understanding of sexual issues. Cronbach's α for the questionnaire is 0.82, which represents good validity and reliability.

Games

All individuals participated in a sequence of three one-shot games on a computer: the ultimatum game (UG), the dictator game (DG) and the trust game (TG). We used the UG and DG to investigate students' strategic fairness and pure fairness. We used the TG to explore trust behaviour in an uncertain situation. Participants were instructed to believe that the decisions they made regarding themselves and others in these games were real and effective, as all the tokens they earned in the games could be exchanged for real gifts after the experiment. None of the participants doubted the cover story or that the bonus would be linked to their actual decisions.

Trust game (TG)

The TG took the form of an investment game to explore students' trust behaviour in an uncertain situation (Berg, Dickhaut, and McCabe 1995; Romano et al. 2017), wherein 'investors' were provided with 10 tokens by the researcher in each round and invested as little or much as they liked. The amount invested was tripled and given to the 'trustee'. The trustees had the chance to decide whether to pay back half of the tripled sum to the investors or to keep it all. The investors would profit if trustees returned half of the sum but would lose if they did not. The amount invested represented the extent of investors' trust, and the amount repaid represented the trustees' trustworthiness. In this game, the participants designated as investors first determined the number of tokens they wished to invest and were then required to estimate the possibility of receiving a return on a Likert scale from 0 (not at all likely) to 10 (very likely) (see Figure 1(a)). Investors played the game with either a friend or a stranger acting as the trustee in a random order.

Ultimatum game (UG)

We used the UG to examine how the students made decisions involving strategic fairness and reacted to unfair distributions. In the UG, the 'proposer' was required to split 10 tokens with the 'responder' who had the option to either accept or reject the offer. If the responder accepted the proposal, the tokens would be divided as suggested by the proposer, whereas neither player would get any tokens if the responder rejected the proposal. If participants were motivated solely by self-interest, they should have offered very few tokens and accepted any non-zero offer. Contrary to this prediction, the average offer was generally 30–50%, and offers below 20% were usually rejected (Camerer 2003). In our experiment, the participants sequentially played the role of the proposer (two trials, see Figure 1(b)) and the responder (12 trials, see Figure 1(c)) with either a friend or a stranger in a random order. While participants were playing as the responder, the proposals they were offered were actually pre-defined by the experimenter and represented three possible categories: fair (5:5, 4:6), unfair (3:7, 2:8), and very unfair allocations (1:9, 0:10). Each proposal type was applied in the same number of trials.

Dictator game (DG)

The DG was similar to the UG but differed in that the 'receiver' could not reject the 'dictator's' offer (see Figure 1(d)). As the receiver had to accept the offer, the dictator's offer could be used as a measure of pure fairness rather than of a strategic fairness that simply sought to avoid rejection (Camerer and Thaler 1995). Participants played only the role of a dictator with either a friend or stranger in a random order. They were instructed

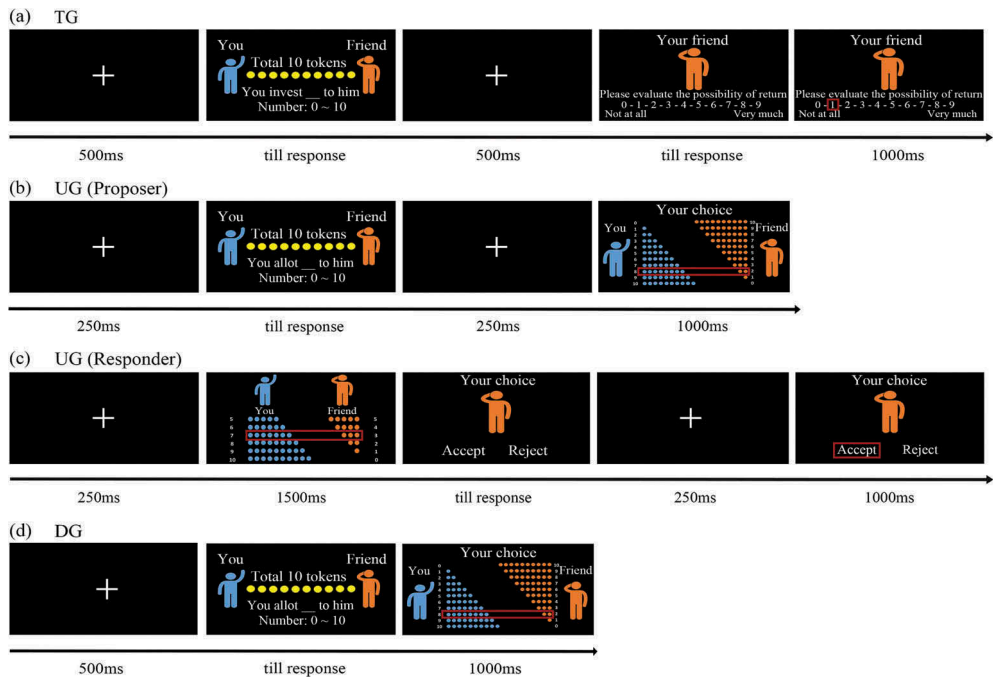


Figure 1. Experimental process diagrams. The sequence of events and timing in a trial when participants acted as the investors in the TG (a), proposers in the UG (b), responders in the UG (c), and dictators in the DG (d).

to decide how many of 10 tokens to give to the receiver and to indicate this response by pressing the corresponding number.

Data analysis

Behavioural data beyond three standard deviations from the mean were excluded as outliers. We first ran independent t-tests for continuous variables and a chi-square test for categorical variables to determine whether the experimental group and the control group were comparable, other than in receiving CSE, in terms of age, sex, SES and school performance. To explore whether CSE influenced the effect of in-group bias on reciprocal behaviours, some irrelevant variables likely to impact the results such as age, sex, school performance, and SES were controlled. Thereafter, we ran separate mixed two-way repeated ANOVAs on the experimental measures (investment and evaluation in the TG; distribution and rejection rate for different fairness levels in the UG; distribution in the DG) with the sexuality education (experimental group vs. control group) as a between-subject factor and partner identity (friend vs. stranger) as a within-subject factor. Statistical significance was set at a two-tailed p-value < 0.05.

Results

Baseline characteristics and CSE questionnaire responses of the study participants

Descriptive data for participants in the experimental group and the control group were presented as means (SDs) or as numbers (%) (see Table 2). There were no statistical differences between the experimental group and the control group regarding age ($t(165) = 0.46, p = 0.65$), sex ($\chi^2 = 0.39, p = 0.53$), school performance ($t(165) = 0.40, p = 0.69$), except for SES ($t(162) = -3.34, p < 0.01$) and CSE questionnaire total score ($t(149) = 8.27, p < 0.001$). The SES of the participants in the control group was higher than in of those in the experimental group (0.22 ± 0.91 vs. -0.19 ± 0.65). Experimental group participants scored higher on the CSE questionnaire, both in terms of total scores and scores in the 10 individual dimensions ($ps < 0.015$).

Trust game

After controlling for age, sex, school performance and SES, the repeated-measures ANOVAs showed a significant main effect of partner identity, $F(1,151) = 9.62, p < 0.01, \eta^2_p = 0.06$. The participants tended to invest more tokens with their friends ($M = 3.22, SE = 0.13$) rather than with strangers ($M = 2.81, SE = 0.14$). There was also a significant interaction between partner identity and sexuality education, $F(1,151) = 4.76, p < 0.05, \eta^2_p = 0.03$, such that more tokens were invested with a friend ($M = 3.35, SE = 0.18$) than with a stranger ($M = 2.64, SE = 0.19$) by participants in the control group, $p < 0.001$, whereas no such difference existed in the experimental group (friend: $M = 3.09, SE = 0.19$; stranger: $M = 2.98, SE = 0.21$), $p = 0.59$ (see Figure 2(a)). No significant main effect of sexuality education was found, $F(1,151) = 0.025, p = 0.87, \eta^2_p = 0$.

Regarding participants' expectations of their partners' trustworthiness, the participants believed that their friends ($M = 5.71, SE = 0.19$) were more likely to return tokens than the strangers ($M = 4.64, SE = 0.21$), $F(1,151) = 22.50, p < 0.001, \eta^2_p = 0.13$. The interaction between partner identity and sexuality education was marginally significant, $F(1,151) = 3.24, p = 0.074, \eta^2_p = 0.02$. Although the partner identity effect was found in both groups, the effect was weaker in the experimental group (friend: $M = 5.50, SE = 0.29$; stranger: $M = 4.86, SE = 0.32$), $p = 0.059$, than in the control group (friend: $M = 5.91, SE = 0.27$; stranger: $M = 4.42, SE = 0.30$), $p < 0.001$ (see Figure 2(b)). No significant main effect of sexuality education was found, $F(1,151) = 0.002, p = 0.96, \eta^2_p = 0$.

Ultimatum game

When the participants played the role of the proposer, a significant main effect of partner identity effect was found, $F(1,152) = 16.32, p < 0.001, \eta^2_p = 0.10$, such that the participants offered their friend ($M = 5.00, SE = 0.09$) more than an unfamiliar stranger ($M = 4.62, SE = 0.10$). The interaction between sexuality education and partner identity was marginally significant, $F(1,152) = 3.75, p = 0.055, \eta^2_p = 0.02$. Post hoc analysis with Bonferroni correction showed that a great number of tokens were distributed to the friend ($M = 5.00, SE = 0.13$) than to the stranger ($M = 4.42, SE = 0.14$) by the participants in the control group, $p < 0.001$, whereas there

Table 2. Characteristics of experimental and control groups. Individual cells indicate means \pm standard deviations.

	Experimental	Control	Group Comparison
N	78	89	
Male (n, %)	43 (55%)	49 (55%)	$\chi^2 = 0.39$
Age	12.40 \pm 0.74	12.35 \pm 0.64	t(165) = 0.46
School Performance ^a	88.85 \pm 8.12	88.37 \pm 7.43	t(165) = 0.40
SES ^b	-0.19 \pm 0.65	0.22 \pm 0.91	t(162) = -3.34**
CSE Questionnaire ^c	59.61 \pm 9.56	47.42 \pm 8.55	t(149) = 8.27***
Family and marriage	6.94 \pm 1.45	5.44 \pm 1.81	t(149) = 5.59***
Life skills	11.13 \pm 1.78	10.35 \pm 2.02	t(149) = 2.48*
Rights	4.31 \pm 1.12	3.27 \pm 1.28	t(149) = 5.29***
Self-protection	5.60 \pm 1.47	4.89 \pm 1.44	t(149) = 3.00**
Reproduction organs	2.76 \pm 0.86	2.14 \pm 1.16	t(149) = 3.72***
Hygiene and health	4.24 \pm 1.19	2.71 \pm 1.36	t(149) = 7.31***
Adolescent development	10.22 \pm 2.72	7.90 \pm 2.37	t(149) = 5.61***
Sexual behaviours	10.46 \pm 2.39	7.80 \pm 2.31	t(149) = 6.96***
HIV	2.82 \pm 1.09	2.10 \pm 1.09	t(149) = 4.04***
Reproduction and contraception	1.14 \pm 0.81	0.82 \pm 0.76	t(149) = 2.47*

^aAverage score of participants' sixth-grade final exams

^bSocio-economic status

^cTotal score of CSE questionnaire and the scores within each of its 10 dimensions

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

was no such difference in the experimental group (friend: $M = 5.00$, $SE = 0.13$; stranger: $M = 4.81$, $SE = 0.14$), $p = 0.17$ (see [Figure 2\(c\)](#)). The main effect of sexuality education was not significant, $F(1,152) = 1.37$, $p = 0.24$, $\eta^2_p = 0.01$.

Regarding participants' rejection rates when they played the role of the responder, the repeated-measures ANOVAs indicated that only in a 'very unfair' condition was the main effect of sexuality education significant, $F(1,151) = 4.63$, $p < 0.05$, $\eta^2_p = 0.03$. Participants in the experimental group ($M = 0.54$, $SE = 0.04$) rejected offers less often when they encountered very unfair treatment compared with those in the control group ($M = 0.66$, $SE = 0.04$).

Dictator game

Similar to the results in the ultimatum game, participants always distributed more tokens to familiar friends ($M = 4.25$, $SE = 0.17$) than to strangers ($M = 3.29$, $SE = 0.15$), $F(1,154) = 29.71$, $p < 0.001$, $\eta^2_p = 0.16$. The marginally significant main effect of sexuality education meant that participants in the experimental group ($M = 4.03$, $SE = 0.19$) often offered more tokens than those in the control group ($M = 3.51$, $SE = 0.18$), $F(1,154) = 3.74$, $p = 0.055$, $\eta^2_p = 0.02$. Notably, there was also a marginally significant interaction between partner identity and sexuality education, $F(1,154) = 2.81$, $p = 0.095$, $\eta^2_p = 0.02$. Post hoc analysis with Bonferroni correction suggested that the experimental group ($M = 3.71$, $SE = 0.22$) differed from the control group ($M = 2.88$, $SE = 0.20$) in that participants in the experimental group transferred more tokens in the stranger condition, $p < 0.01$, while there was no difference between the two groups in the friend condition (experimental: $M = 4.36$, $SE = 0.25$; control: $M = 4.15$, $SE = 0.23$), $p = 0.55$ (see [Figure 2\(d\)](#)).

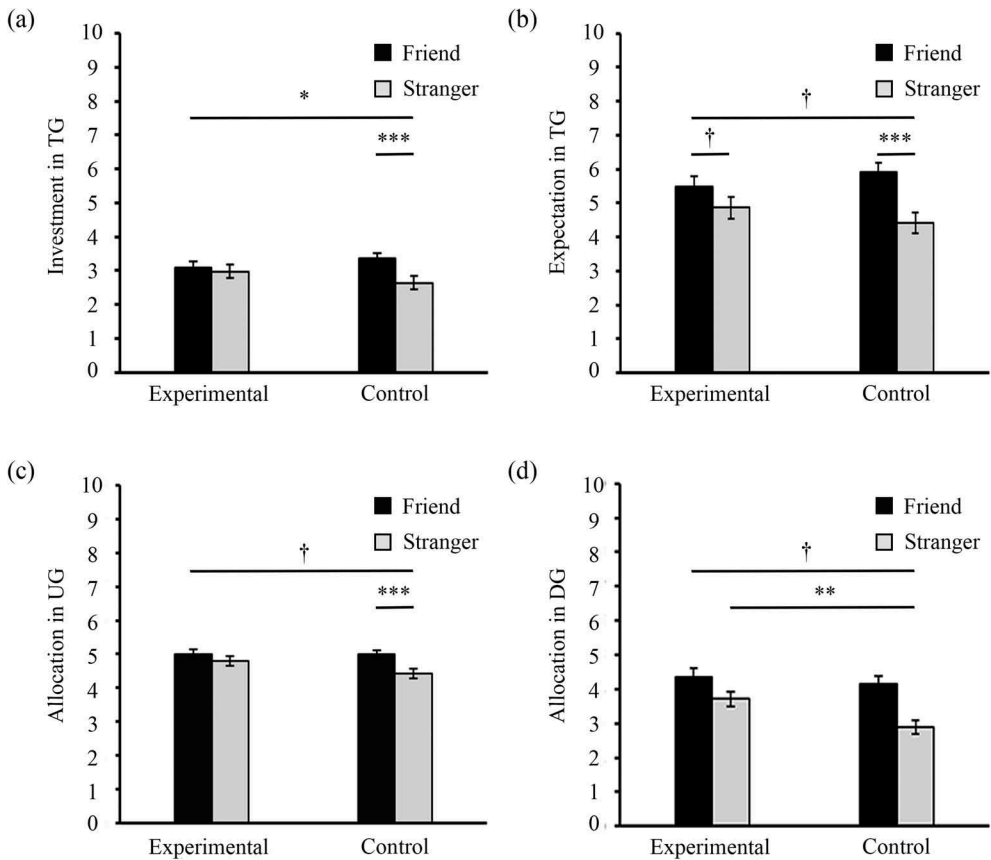


Figure 2. Reciprocal behaviour results. Participants' investment in the TG (a), expectation in the TG (b), allocation in the UG (c), and allocation in the DG (d). † $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Discussion

The students receiving CSE acquired more comprehensive sexual knowledge. Furthermore, the series of experiments described in this paper demonstrated the impact of the egalitarianism advocated by CSE on children's social development after controlling for SES, age, sex and school performance. This egalitarianism improved individuals' pure fairness in the DG, along with weakening the effect of in-group bias on initial trust and distributive fairness.

Compared to the control group, students receiving CSE were willing to behave as though they had the same level of trust and invest the same amount of tokens with trustees irrespective of the trustees' identity, even if they also believed that their friends were more likely to return tokens than were the strangers. Similar results were also found regarding strategic and pure fairness: the students in the experimental group treated strangers and friends equally, in that they distributed the same amount to both the friends and strangers in the UG and offered more tokens to strangers in the DG than did those in the control group. These results indicated that the egalitarianism promoted by CSE impacted the children's social development not only in the pure distributive fairness between themselves and others, but also in their cooperation with partners of various identities.

These results validate the effectiveness of CSE in one of its core goals: not only providing comprehensive, accurate, positive and developmentally appropriate information on human sexuality but also promoting the development of relevant personal and interpersonal skills (Constantine, Slater, and Carroll 2007). As shown by earlier research, physical violence among young men was reported to decline after receiving CSE (Greubel 2012). CSE addressing the topic of sexual diversity creates safer school climates through decreasing the occurrence of verbal bullying and increasing students' perceived willingness to intervene when witnessing verbal bullying (Baams, Semon, and Marcel 2017). This study has shown that CSE weakened the effect of in-group bias on trust and fairness during children's social interactions. These results may be due both to CSE's content and its educational approach. In this study, which underlined egalitarian attitudes and harmonious social interactions, the CSE received by participants in the experimental group called for treating everyone in an equal and fair manner. In the CSE classes, teachers encouraged students to imagine their interactions with people belonging to minority groups (such as people living with disabilities, LGBTQ people, and people with different ideologies) in order to create an egalitarian and positive atmosphere, employing indirect intergroup contact to reduce out-group prejudice (Allport 1954; Turner, Crisp, and Lambert 2007). When students received comprehensive and accurate information regarding minorities, such as LGBTQ people, and subsequently encountered unfair situations or information, students were more willing to actively intervene (Poteat 2015). This long-term subtle impact reaches deeper, acting on the automatic and rapid responses that guide individuals' decision-making (Evans 2008; Gantman and Van Bavel 2015). Therefore, students who have received CSE may be expected to adopt more egalitarian attitudes and relationships in many aspects of life that weaken the effect of in-group bias in social cooperation.

CSE is gaining growing acceptance globally, and such education should start as early as possible to cultivate mature and rational decisions in an age-appropriate manner. CSE provides development-specific information with an emphasis on the positive aspects of sexuality and provides accurate and complete information, as opposed to emphasising risks and warnings; this approach generally effective, particularly in reducing sexually transmitted infections and unintended pregnancy, and helps young people take responsibility and make wise decisions concerning sexuality (Haberland and Rogow 2015; van der Doef and Reinders 2018). Another beneficial result is that the egalitarianism advocated by CSE weakens the effect of in-group bias in students' social decision-making in various contexts. To some extent, in-group bias exists as an evolutionary adaptation that may have provided individuals with an increased probability of survival; however, it usually leads to competition, prejudice, hostility, and even intractable conflicts between intergroup members that serve to constrain the long-term development of interpersonal and intergroup interactions (Balliet, Wu, and De Dreu 2014). Unlike adults, who already have mature social networks and stable interpersonal relationships, children are typically deemed to be more vulnerable to in-group bias. It hinders them from experiencing and associating with unfamiliar individuals and different social groups, damaging children's socialisation process. In contrast, the adoption of egalitarian attitudes in managing interpersonal relationships and making decisions might be expected to help children integrate into society. Concretely speaking, treating friends and other children with the same level of trust contributes to getting more opportunities to establish social relationships; treating friends and others with the same degree of fairness is also conducive to

developing a better personal reputation, which in turn promotes cooperation and friendship. These results help justify the implementation of localised versions of the international CSE standards in Chinese culture and Chinese CSE classes. The real barrier to implementing CSE in China lies in presenting its key qualities in a manner that will help parents and teachers understand it correctly. The values promoted by international forms of CSE, such as equality and respect, are fully in line with Chinese culture. If family members, community members, and school staff can understand that CSE is not only about physiological knowledge and physiological hygiene, but also about friendships, life skills and other important values consistent with Chinese culture, it will likely facilitate its implementation. Our findings provide a new perspective on and argument for the necessity of CSE implementation.

Limitations

This study has some limitations. First, the implementation of CSE in China is still in its infancy. CSE has been carried out in a few schools at the present stage, and the research samples are relatively small. In further research, it is planned to promote CSE on a large scale and expand the sample size. Second, the participants who received CSE in the experimental group in this study were migrant children. In order to reduce the influence caused by the characteristics of the experimental samples and guarantee the external validity of the results, the participants in the control group were also migrant children, and the schools of the two groups were in the same district with comparable teaching quality, regional economic development level, campus culture, and campus atmosphere. In addition, the two groups were matched for demographic information and some demographic variables such as age, sex, school performance, and SES, were all controlled as covariates in the data analysis. Further research needs to be carried out in various groups to make the experimental samples sufficiently representative. Finally, some effects were marginally significant, suggesting that our study was likely underpowered to adequately detect effects. This may partially attribute to the control of irrelevant variables in our data analysis. However, despite the marginally significant interaction, post hoc analysis with Bonferroni correction showed the fairly significant different attitudes of participants in the experimental group and control group towards their friends and unfamiliar strangers, and this tendency was consistent across all three games. In addition, we also found the effect of egalitarianism provided by CSE on other decisions. In our other study, the experimental group exhibited fewer gender stereotypes than the control group. To be more specific, participants in the experimental group treated men and women equally without discrimination in terms of their ability, behaviour, occupation and appearance. To investigate whether the egalitarianism encouraged by CSE has a stable influence on social decision-making, further work may need to incorporate other social games, such as the second- and third-party punishment game (Gummerum and Chu 2014).

Conclusion

Study findings suggest that other than its impact on the sexual health, CSE may exert an influence on children's social development and interpersonal attitudes. Compared with

the control group in this study, students receiving CSE offered more tokens to strangers in the DG and were more willing to distribute and invest the same number of tokens with their friends and strangers in the UG and TG. These results indicated that the students who received CSE adopted more egalitarian attitudes and relationships, thereby weakening the effect of in-group bias on the fairness and trust. Our findings not only reaffirm the necessity of CSE implementation but also provide a new perspective for further research regarding the impact of CSE.

Disclosure statement

No potential conflict of interest was reported by the authors.

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