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Girls are made of sugar and spice and everything nice, but what are boys made of? A randomized control trial suggests the effects of a school-based kindness intervention vary by gender

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ABSTRACT

While previous research suggests that kindness interventions in schools can effectively increase kind behaviors, more randomized controlled trials (RCTs) are needed, particularly those examining gender differences. To address this gap, we conducted a matched-pair cluster-RCT with students aged 10–13 in the UK and Spain, analyzing results by gender. The intervention, lasting eight weeks, combined an acts-of-kindness scavenger hunt with weekly journal reflections. Results showed an increase in kindness among girls, but not among boys. Unexpectedly, boys showed increased anxiety following the intervention. This gender difference may stem from the type of kindness promoted—more relational and reflective—which girls may find easier to adopt. It may also relate to girls having more psychological resources for such activities. These findings highlight the need to consider gender-specific responses when designing kindness interventions. They also raise broader questions about how to differentiate character education to ensure it is effective for diverse learners. Addressing these nuances can improve the design and impact of programs aimed at fostering prosocial behavior in young people.

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Introduction

How can we support students to enjoy more happiness, satisfaction with their lives, better physical and mental health, a sense of meaning and purpose, and positive relationships? Research suggests that teaching students to practice kindness has the potential to

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contribute to all of these aspects of flourishing (Hinton et al., 2024; VanderWeele & Hinton, 2024). Kindness involves care for others that 'gives rise to helping behaviors that are not based on an assurance of reciprocity, reputational gain, or any other benefits to self' (Peterson & Seligman, 2004, p. 326). School-age students often describe kindness as helping, respecting, and encouraging others (J. T. Binfet & Passmore, 2019). Research shows that acting kindly can increase happiness and life satisfaction, decrease anxiety and depression, improve physical health and support overall wellbeing (Bluth & Eisenlohr-Moul, 2017; Cotney & Banerjee, 2019; Datu et al., 2021; Hui et al., 2020; Kerr et al., 2015; Lyubomirsky et al., 2005; Otake et al., 2006; VanderWeele, 2017, 2020). Moreover, kindness can broaden our perspectives to beyond-the-self goals that bring a sense of meaning and purpose (J. T. Binfet & Gaertner, 2015; Layous et al., 2012). Along with this, kindness is linked with prosocial behaviors that foster positive relationships (Lee & Huang, 2021; Oğuz-Duranand & Kaya-Memiş, 2017).

Randomized controlled trials (RCTs) have demonstrated that kindness interventions in educational settings can effectively support students' kindness and flourishing. For example, a RCT showed that preschoolers who participated in a 12-week mindfulness-based kindness curriculum showed improved social competence, including delayed gratification, relative to controls (Flook et al., 2015). RCTs with university students have also shown that interventions in which students carry out acts of kindness can improve happiness (Otake et al., 2006) and wellbeing (Lyubomirsky et al., 2005). While RCTs on kindness interventions with school-aged students are sparse, one RCT with students aged 9–11 showed that an intervention in which students engaged in three acts of kindness a week for four weeks increased peer acceptance (Layous et al., 2012).

More RCTs on character interventions for students are needed (Berkowitz et al., 2008; Pressman et al., 2015), and there is a particular dearth of RCTs on kindness interventions for school-aged students. In addition, we are not aware of any RCTs that have explored potential gender differences in the impact of kindness interventions, although research has demonstrated that interventions targeting related skills, such as self-compassion, can have differential impacts based on gender (Bluth & Eisenlohr-Moul, 2017). In this study, we addressed these gaps in the literature by conducting a RCT on a kindness intervention for students aged 10–13 and exploring potential gender differences in the impact of the intervention. While we were curious about the possibility of differential impacts on gender, we originally hypothesized that our intervention would positively impact kindness in all students.

Methods

We conducted a matched-pair cluster-randomized controlled trial to investigate the potential impact of a school-based kindness intervention. The study protocol is pre-registered in the Open Science Framework at: https://osf.io/d5arn?view_only=08a7e40c29524b6698ce789a5b7e7821

Participants and randomization

Six schools participated in the study across the UK and Spain. In the UK, an all-girls school, an all-boys school, and a co-educational school participated. In Spain, an all-girls

school, an all-boys school, and a co-educational school also participated. Among students aged 10–13 years old who attend these schools, we included a total of 19 UK classrooms and 20 Spanish classrooms with an average classroom size of 20 students in our study. This sample size was considered large enough to detect intervention effects greater than 0.2 standard deviations under the assumption of an intraclass correlation of 0.05 and a cluster size of 20 (Goesling, 2019).

We conducted a matched-pair cluster-randomized controlled trial design (Imai et al., 2009). We made a set of pair-matched classrooms at the school level by using the information on classroom characteristics that the schools provided to the research team. For the matching process, we aimed to form groups with 1) similar size, 2) similar mean age and 3) similar proportion of boys and girls. We typically matched classes of the same grades, but in schools without an even number of classes in each grade, we matched the class of the lower grade with the highest mean age with the class of the higher grade with the lowest mean age. In schools without an even number of groups for each level, the youngest group of the older grade was paired with the oldest group of the younger. Twelve UK classrooms were paired at random due to the similarity in the three matching criteria. One UK classroom was excluded from the study due to the lack of another classroom to be matched with. No classrooms were excluded from the study in Spain. Thus, our final sample was 38 classrooms. After matching the pairs, we randomized the classrooms to the experimental group and control group. Teachers in the classroom were informed of which classrooms were in the experimental and control groups as they were the main facilitators of the intervention; students were not informed of their assigned groups or the aim of the intervention.

Intervention

We created a *Spread Kindness Like Confetti* intervention, which has two main parts: a scavenger hunt and a weekly reflection (Appendix A). Over eight weeks from January 2024 - March 2024, students in the intervention group were asked to play the *Spread Kindness Like Confetti* scavenger hunt. In this activity, students were asked to check off acts of kindness they performed, experienced, or observed. Alongside the scavenger hunt, students in the intervention group completed a weekly 20-minute journal reflection about the kind acts that responded to question prompts provided by researchers. Teachers in each classroom implemented this intervention.

Our research team created this innovative intervention based on previous research on what makes kindness interventions effective. For example, previous research shows that even witnessing kind acts can inspire other kind acts (Baskerville et al., 2000) so our scavenger hunt included noticing kind acts as well as carrying out kind acts. Relatedly, research suggests that when students practice gratitude, it supports their wellbeing, which ultimately promotes greater kindness (Layous et al., 2013, 2015) so our scavenger hunt and journal reflections encouraged students to practice gratitude for kind acts along with carrying out kind acts. In addition, previous studies suggest that character interventions that engage participants in structured versus self-initiated activities are more effective (Buchanan & Bardi, 2010; Lyubomirsky & Layous, 2013; Lyubomirsky et al., 2005) and varied kind acts are most effective (Sheldon & Lyubomirsky, 2007; Sheldon et al., 2012) so our scavenger hunt provided

a structured list of a variety of kind acts. During the creation of the intervention, we held focus groups with co-educational groups of students aged 10–13 in the UK and Spain and teachers who teach students aged 10–13 in the UK and Spain and used their feedback to adapt the intervention with the goal of making it culturally relevant, effective, and engaging.

Measures

Students in both the control and experimental groups filled out baseline and follow-up questionnaires just before and just after the intervention, respectively. These questionnaires included the School Kindness Scale (J. T. Binfet, 2015) and several measures related to various aspects of flourishing, including one that measures anxiety symptoms (Chorpita et al., 2000). Further, to assess the implementation of the intervention, we asked students about how frequently they had performed kind acts and received kind acts from classmates in the past 8 weeks in the baseline survey before the start of the intervention and in the follow-up survey after the intervention. In addition to these measures, we obtained demographic information, which included grade, birth month, sex, level of parental education, number of siblings, financial aid use, and learning support status.

Statistical analyses

We evaluated the quality of randomization by comparing the baseline characteristics between the intervention and control groups across each country. To assess the effectiveness of the intervention on School Kindness Scale (J. T. Binfet, 2015) and/or anxiety (Chorpita et al., 2000), we used two multilevel regression models to consider our nested data structures (school, classroom, and student). The intervention effect in this model was identified as the regression of the Level 1 (student) slope for Time (Questionnaire 1 vs. Questionnaire 2) on the Level 2 (classroom) intervention/control group variable. The school was added as part to the Level 3 (school) of the model. To consider the matched-pair design, Hausman tests were performed to check the consistency and efficiency of including classroom pairs as part of the fixed effects of the regression models. All tests yielded non-significant results, so the pairs were included as part of the random effects instead to get more efficient models given the number of pairs (Snijders & Bosker, 2012). All models were adjusted for sex, age, number of younger and older siblings, having parents with university students, having been granted a scholarship, or receiving educational support due to learning difficulties, and the following wellbeing scales: gratitude, flourishing, relationship with tutor, relationship with peers, classroom climate, prosocial behavior, seeing the good in others, loneliness, love the others, depression symptoms, and anxiety symptoms or kindness. We first examined the impact of the intervention on the whole sample; then, we stratified our analysis by gender to evaluate whether the impact of the intervention differed, based on the prior evidence.

For all the analyses described above, missing values were imputed through the Markov chain equations method for multiple imputations. Five imputed datasets were generated for the analyses.

Further, we conducted four sensitivity analyses. First, we conducted a sensitivity analysis with the participants that filled in all the items of the variables included in our analytical models (Complete-Case analysis) to assess whether differences could result from data that might not have been missing at random. Second, we replicated the analyses for the subsample of participants that finished the questionnaires with all items filled (Full-Respondent analyses) to evaluate the consistency of our findings in a fully compliant subsample. Third, we replicated all the models after excluding the pairs resulting from matching classrooms with different ages from the analysis. Lastly, we calculated E-values for all assessed associations to evaluate the minimum strength of association required for an unmeasured confounder to have with both the exposure and outcomes to fully explain away the associations found (VanderWeele & Ding, 2017).

All statistical analyses were performed in Stata 18. Authors tasked with statistical analyses were blinded to the intervention and control group allocation.

Results

Sample

After gathering the two waves of data, we obtained a sample of 198 English students and 442 Spanish students in the first wave, and 200 English students and 404 Spanish in the second wave. We excluded students with incoherent responses ($n = 57$). The final sample had a completion rate of above 95% for wave 1 in England (Wave 1 = 95.5%, Wave 2 = 97.7%) and above 98% for in Spain (Wave 1 = 98.6%; Wave 2 = 99.2%).

In the UK, 198 students (57.6% male, 42.4% female) were included in the sample, with 106 in the control group and 92 in the intervention group (See Table 1). In Spain, 442 students (49.8% male, 50.2% female) were included in the sample, with 220 in the control group and 222 in the intervention group (See Table 2). For samples from both countries, there was no significant difference between the groups in all demographic characteristics of the sample, including age, sex, parental education, number of siblings, scholarship status, and whether the student required learning support.

The Cronbach's alpha and intraclass correlation scores for all constructs assessed at baseline can be found in Supplementary Table S1. The outcome constructs showed acceptable internal consistency (e.g., above 0.7). Regarding intraclass correlation scores, most of the assessed scales had an intraclass correlation higher than the a priori assumed score of 0.05, with kindness and anxiety scoring around 0.2 and 0.3, respectively. This issue, combined with the actual sample recruited ($n = 640$), gives us a 30% chance of detecting small effects of the intervention with our models.

The impact of the kindness intervention

Table 3 shows the standardized effects and E-values of the kindness intervention on kindness and anxiety among all samples and gender-stratified samples for the multiple-imputed sample. Table 4 shows the standardized effects and E-values for the supplementary analysis with case-complete.

Table 1. Baseline characteristics of English schools.

Characteristic	Total sample (n=198)	Control group (n=106)	Intervention group (n=92)	p value
What is your sex?				0.471
Male	114 (57.6)	64 (60.4)	50 (54.3)	
Female	84 (42.4)	42 (39.6)	42 (45.7)	
Parents' education				0.410
Doctoral degree	25 (12.6)	11 (10.4)	14 (15.2)	
Master's degree	50 (25.3)	32 (30.2)	18 (19.6)	
University degree	91 (46.0)	46 (43.4)	45 (48.9)	
Some university (started but did not obtain a degree)	10 (5.1)	5 (4.7)	5 (5.4)	
A levels or equivalent	10 (5.1)	4 (3.8)	6 (6.5)	
GCSEs or equivalent	12 (6.1)	8 (7.5)	4 (4.3)	
Older siblings				0.083
None	67 (33.8)	31 (29.2)	36 (39.1)	
One	59 (29.8)	29 (27.4)	30 (32.6)	
Two or more	72 (36.4)	46 (43.4)	26 (28.3)	
Younger siblings				0.573
None	107 (54.0)	57 (53.8)	50 (54.3)	
One	53 (26.8)	26 (24.5)	27 (29.3)	
Two or more	38 (19.2)	23 (21.7)	15 (16.3)	
Received scholarship				0.338
Yes	96 (48.5)	47 (44.3)	49 (53.3)	
No	59 (29.8)	36 (34.0)	23 (25.0)	
I don't know	43 (21.7)	23 (21.7)	20 (21.7)	
Received learning support				0.869
Yes	150 (75.8)	81 (76.4)	69 (75.0)	
No	48 (24.2)	25 (23.6)	23 (25.0)	
Flourishing	7.7 (1.3)	7.7 (1.3)	7.8 (1.3)	0.438
Gratitude	3.0 (0.9)	3.0 (0.9)	3.0 (0.9)	0.943
Kindness	3.8 (0.7)	3.7 (0.7)	3.9 (0.7)	0.048
Seeing good in others	3.8 (0.7)	3.8 (0.7)	3.9 (0.7)	0.213
Relation with tutor	3.7 (0.8)	3.6 (0.8)	4.0 (0.8)	0.001
Relation with peers	3.6 (0.6)	3.6 (0.6)	3.7 (0.6)	0.182
Relation with classroom	2.9 (0.6)	2.9 (0.5)	2.9 (0.6)	0.577
Love the other	3.9 (0.8)	3.9 (0.9)	4.0 (0.8)	0.487
Friendship	5.4 (1.2)	5.3 (1.1)	5.4 (1.3)	0.535
Prosocial	2.5 (0.3)	2.5 (0.3)	2.6 (0.3)	0.178
Loneliness	1.9 (0.7)	1.8 (0.6)	2.0 (0.8)	0.185
Depression	1.7 (0.6)	1.7 (0.6)	1.8 (0.7)	0.481
Anxiety	2.1 (0.8)	2.1 (0.8)	2.2 (0.8)	0.427
Acts of kindness received last month				0.064
Rarely	6 (3.0)	2 (1.9)	4 (4.3)	
Sometimes	68 (34.3)	44 (41.5)	24 (26.1)	
Often	115 (58.1)	56 (52.8)	59 (64.1)	
Acts of kindness done last month				0.077
Rarely	19 (9.6)	6 (5.7)	13 (14.1)	
Sometimes	74 (37.4)	45 (42.5)	29 (31.5)	
Often	96 (48.5)	51 (48.1)	45 (48.9)	
How important are your relationships to you?				0.353
Not at all important	3 (1.1)	3 (2.2)	0 (0.0)	
Slightly important	7 (2.7)	5 (3.7)	2 (1.6)	
Moderately important	40 (15.2)	20 (14.8)	20 (15.5)	
Very important	82 (31.1)	38 (28.1)	44 (34.1)	
Extremely important	132 (50.0)	69 (51.1)	63 (48.8)	
How important is it to be kind?				0.768
Not at all important	0 (0.0)	0 (0.0)	0 (0.0)	
Slightly important	3 (1.5)	2 (1.9)	1 (1.1)	3 (1.5)
Moderately important	26 (13.1)	16 (15.1)	10 (10.9)	26 (13.1)
Very important	64 (32.3)	35 (33.0)	29 (31.5)	64 (32.3)
Extremely important	96 (48.5)	49 (46.2)	47 (51.1)	96 (48.5)

(*Continued*)

Table 1. (Continued).

Characteristic	Total sample (n=198)	Control group (n=106)	Intervention group (n=92)	p value
How important is it to be grateful?				0.730
Not at all important	0 (0.0)	0 (0.0)	0 (0.0)	
Slightly important	2 (1.0)	1 (0.9)	1 (1.1)	
Moderately important	13 (6.6)	9 (8.5)	4 (4.3)	
Very important	47 (23.7)	26 (24.5)	21 (22.8)	
Extremely important	127 (64.1)	66 (62.3)	61 (66.3)	

In the multiple-imputed analyses (Table 3), girls in the intervention group showed a greater increase in kindness compared to those in the control group (beta = 0.15, 95% CI = 0.01, 0.30, $p = 0.039$). This finding was not observed among boys (beta = 0.04, 95% CI = −0.14, 0.21, $p = 0.677$). Boys in the intervention group showed a significantly greater increase in anxiety symptoms compared to those in the control group (beta = 0.28, 95% CI = 0.07, 0.48, $p = 0.010$), while no strong association was observed for girls (beta = 0.11, 95%CI = −0.11, 0.33, $p = 0.312$). Overall, kindness scores were higher in the intervention group, but the difference was not statistically significant (beta = 0.08, 95%CI = −0.04, 0.20, $p = 0.206$).

Results were very similar with the complete-case analysis; there were slight variations in the estimates at the centesimal level (Table 4). Similarly, results did not change significantly after excluding the pairs resulting from matching classrooms with different ages from the analysis.

Finally, the E-values calculated for all of these significant associations indicated that any unmeasured confounder should have a weak association with both the intervention and kindness scores for girls (Lower 95%CI E-value = 1.09), and a somewhat stronger association with the intervention and anxiety for boys (Lower 95%CI E-value = 1.32), to shift the confidence interval of the assessed associations to include the null value, conditionally of the other measured variables.

Discussion

We conducted a matched-pair cluster-randomized controlled trial to investigate the potential impact of a school-based kindness intervention. Further research is needed to fully understand the impact of the *Spread Kindness Like Confetti* intervention, as the size of our sample (640) would only give us a 30% chance of detecting small impacts of the intervention, and previous research suggests that character interventions tend to have small impacts (Bates-Krakoff et al., 2022; Ghielen et al., 2018; White et al., 2019). Results from this study suggest a modest increase in kindness among girls in the intervention group. In contrast, we did not find an increase in kindness in boys and, unexpectedly, found a significant increase in anxiety among boys. The effect sizes were modest in both cases.

It is possible that the observed gender difference in the impact of the intervention could be partially explained by our intervention favoring an approach to kindness that tends to be more readily adopted by girls. Research suggests that girls are more likely to express kindness through giving compliments and providing emotional support (J.-T. Binfet & Whitehead, 2019), which were performance items of our *Spread Kindness Like*

Table 2. Baseline characteristics of Spanish schools.

Characteristic	Total sample (n=442)	Control group (n=220)	Intervention group (n=222)	p value
What is your sex?				0.925
Male	222 (50.2)	110 (50.0)	112 (50.5)	
Female	220 (49.8)	110 (50.0)	110 (49.5)	
Parents' education				0.531
Doctoral degree	55 (12.4)	26 (11.6)	29 (13.1)	
Master's degree	277 (62.7)	137 (62.3)	140 (63.1)	
University degree	36 (8.1)	15 (6.8)	21 (9.5)	
Some university (started but did not obtain a degree)	26 (5.9)	13 (5.9)	13 (5.9)	
A levels or equivalent	14 (3.2)	7 (3.2)	7 (3.2)	
GCSEs or equivalent	34 (7.7)	22 (10.0)	12 (5.4)	
Older siblings				0.573
None	226 (51.1)	116 (52.7)	110 (49.5)	
One	133 (30.1)	67 (30.5)	66 (29.7)	
Two or more	83 (18.8)	37 (16.8)	46 (20.7)	
Younger siblings				0.066
None	225 (50.9)	123 (55.9)	102 (45.9)	
One	151 (34.2)	71 (32.3)	80 (36.0)	
Two or more	66 (14.9)	26 (11.8)	40 (18.0)	
Received scholarship				0.191
Yes	180 (40.7)	92 (41.8)	88 (39.6)	
No	37 (8.4)	13 (5.9)	24 (10.8)	
I don't know	225 (50.9)	115 (52.3)	110 (49.5)	
Received learning support				0.693
Yes	374 (84.6)	188 (85.5)	186 (83.8)	
No	68 (15.4)	32 (14.5)	36 (16.2)	
Flourishing	8.5 (1.2)	8.6 (1.0)	8.4 (1.3)	0.020
Gratitude	2.9 (0.8)	3.0 (0.8)	2.8 (0.9)	0.102
Kindness	4.2 (0.6)	4.3 (0.6)	4.2 (0.6)	0.098
Seeing good in others	4.1 (0.6)	4.1 (0.6)	4.1 (0.6)	0.913
Relation with tutor	4.2 (0.9)	4.4 (0.8)	4.1 (1.0)	0.007
Relation with peers	3.8 (0.6)	3.8 (0.5)	3.8 (0.6)	0.424
Relation with classroom	3.1 (0.6)	3.2 (0.5)	3.1 (0.6)	0.084
Love the other	4.5 (0.7)	4.5 (0.6)	4.4 (0.7)	0.293
Friendship	6.0 (1.2)	6.1 (1.1)	6.0 (1.3)	0.423
Prosocial	2.7 (0.3)	2.7 (0.3)	2.6 (0.3)	0.424
Loneliness	1.9 (0.8)	1.9 (0.8)	2.0 (0.8)	0.399
Depression	1.7 (0.7)	1.7 (0.6)	1.8 (0.7)	0.061
Anxiety	3.3 (1.0)	3.3 (0.9)	3.3 (1.1)	0.632
Acts of kindness received last month				0.330
Rarely	16 (3.6)	5 (2.3)	11 (5.0)	
Sometimes	199 (45.0)	102 (46.4)	97 (43.7)	
Often	221 (50.0)	112 (50.9)	109 (49.1)	
Acts of kindness done last month				0.634
Rarely	53 (12.0)	27 (12.3)	26 (11.7)	
Sometimes	202 (45.7)	106 (48.2)	96 (43.2)	
Often	181 (41.0)	86 (39.1)	95 (42.8)	
How important are your relationships to you?				0.577
Not at all important	6 (1.4)	4 (1.8)	2 (0.9)	
Slightly important	11 (2.5)	4 (1.8)	7 (3.2)	
Moderately important	46 (10.4)	24 (10.9)	22 (9.9)	
Very important	172 (38.9)	92 (41.8)	80 (36.0)	
Extremely important	201 (45.5)	95 (43.2)	106 (47.7)	
How important is it to be kind?				0.854
Not at all important	4 (0.9)	3 (1.4)	1 (0.5)	
Slightly important	10 (2.3)	4 (1.8)	6 (2.7)	
Moderately important	28 (6.3)	13 (5.9)	15 (6.8)	
Very important	152 (34.4)	77 (35.0)	75 (33.8)	
Extremely important	242 (54.8)	122 (55.5)	120 (54.1)	

(*Continued*)

Table 2. (Continued).

Characteristic	Total sample (n=442)	Control group (n=220)	Intervention group (n=222)	p value
How important is it to be grateful?				0.183
Not at all important	7 (1.6)	3 (1.4)	4 (1.8)	
Slightly important	5 (1.1)	0 (0.0)	5 (2.3)	
Moderately important	26 (5.9)	12 (5.5)	14 (6.3)	
Very important	156 (35.3)	76 (34.5)	80 (36.0)	
Extremely important	242 (54.8)	128 (58.2)	114 (51.4)	

Table 3. Standardized effects of the kindness intervention in the list of outcomes on all samples and stratified by gender (multiple-imputed data).

Outcome	Beta (95%CI)[1]	p value	E-value (lower 95%CI)[2]
Kindness			
Whole sample	0.08 (−0.04, 0.20)	0.206	1.35 (1.00)
Girls	0.15 (0.01, 0.30)	0.039	1.57 (1.09)
Boys	0.04 (−0.14, 0.21)	0.677	1.23 (1.00)
Anxiety symptoms			
Whole sample	0.21 (0.06, 0.36)	0.006	1.72 (1.30)
Girls	0.11 (−0.11, 0.33)	0.312	1.46 (1.00)
Boys	0.28 (0.07, 0.48)	0.010	1.89 (1.32)

[1]Standardized beta coefficients from the interaction product-term between the intervention group and the wave variables in a multilevel regression model. All models were adjusted for sex, age, number of younger and older siblings, having parents with university students, having been granted a scholarship or receiving educational support due to learning difficulties, gratitude, flourishing, relationship with the tutor, relationship with peers, classroom climate, prosocial behavior, seeing the good in others, loneliness, love the others, depression symptoms, and the rest of the variables in the table as part of the fixed effects of the model.

[2]E-values for the beta coefficients are the minimum strength of association on the risk ratio scale that an unmeasured confounder would need to have with both the exposure and the outcome to fully explain away the observed association between the exposure and outcome, conditional on the measured covariates. Similarly, the lower limit of the 95% confidence interval for each E-value is the minimum strength of association that an unmeasured confounder would need to have with the exposure and the outcome to shift the Confidence Interval of include the null value, conditional on the measured covariates.

Confetti intervention. For example, our intervention asked participants to 'give a compliment to a friend,' 'give a compliment to a teacher,' and 'tell your friend something that you appreciate about their personality.' Likewise, it instructed participants to provide emotional support, such as: 'offer words of encouragement to a friend or family member who is struggling,' 'if you notice that someone looks sad, ask them how they're doing,' 'when someone expresses feeling overwhelmed or stressed, ask if there is anything you can do to help,' and 'cheer up a friend.' Research suggests that boys, in contrast to girls, tend to conceptualize their kindness through themes pertaining to helping physically (J. T. Binfet & Gaertner, 2015) and in more heroic or chivalrous ways (Eagly & Crowley, 1986; Maccoby & Jacklin, 1978), which were less prevalent in the intervention. In broad societal terms, while girls are often expected to be more nurturing and empathetic (Cole et al., 1994), boys are often socialized to be more independent and less expressive of their emotions (Leaper & Friedman, 2007). Thus, it is unsurprising that boys and girls might tend to conceptualize and express kindness in different ways. We might speculate that the observed increase in anxiety could be partially explained by some boys experiencing an internal conflict between what they were asked to do in the

Table 4. Standardized effects of the kindness intervention in the list of outcomes on all samples and stratified by gender in the case-complete analyses.

Outcome	Beta (95%CI)[1]	p value	E-value (lower 95%CI)[2]
Kindness			
Whole sample	0.07 (−0.05, 0.19)	0.240	1.34 (1.00)
Girls	0.16 (0.01, 0.31)	0.037	1.58 (1.10)
Boys	0.03 (−0.15, 0.20)	0.761	1.19 (1.00)
Anxiety symptoms			
Whole sample	0.20 (0.05, 0.35)	0.009	1.70 (1.27)
Girls	0.11 (−0.11, 0.33)	0.341	1.44 (1.00)
Boys	0.27 (0.07, 0.48)	0.010	1.89 (1.32)

[1]Standardized beta coefficients from the interaction product-term between the intervention group and the wave variables in a multilevel regression model. All models were adjusted for sex, age, number of younger and older siblings, having parents with university students, having been granted a scholarship or receiving educational support due to learning difficulties, gratitude, flourishing, relationship with the tutor, relationship with peers, classroom climate, prosocial behavior, seeing the good in others, loneliness, love the others, depression symptoms, and the rest of the variables in the table as part of the fixed effects of the model.

[2]E-values for the beta coefficients are the minimum strength of association on the risk ratio scale that an unmeasured confounder would need to have with both the exposure and the outcome to fully explain away the observed association between the exposure and outcome, conditional on the measured covariates. Similarly, the lower limit of the 95% confidence interval for each E-value is the minimum strength of association that an unmeasured confounder would need to have with the exposure and the outcome to shift the Confidence Interval of include the null value, conditional on the measured covariates.

intervention and the traditional gender norms ascribed to them: the former encourages novel forms of emotional expression that the latter discourages. Given that boys and girls tend to have different ways of understanding and expressing kindness, and the intervention encouraged acts of kindness that tend to resonate with girls more than boys, it makes sense that the intervention was found to be effective for girls but not boys. To develop the intervention, we held focus groups with teachers and students, including boys and girls. However, while we asked questions specifically about the cultural congruence of the intervention, we did not ask questions specifically about whether the items are likely to resonate with students of different genders. Given our results, we suggest that researchers consider potential gender differences in students' conceptualization of and expression of kindness and design kindness interventions with sensitivity to a diverse array of approaches to kindness.

Relatedly, it is also possible that the differences in effects based on gender might be partially explained by girls having more psychological resources to engage in the kinds of kindness activities in the intervention, on average. Previous studies have found that girls tend to exhibit higher levels of many prosocial behaviors, such as helping, communicating emotions, and expressing gratitude (Gordon et al., 2004; Kring & Sloan, 2009; Nantel-Vivier et al., 2009). The *Spread Kindness Like Confetti* intervention included items that draw on some of the complex social-emotional skills that girls tend to score higher on. For example, the intervention asked students to 'offer words of encouragement to a friend or family member who is struggling,' 'cheer up a friend,' 'make a friend a thank you card or send a friend a thank you message,' or 'write someone a thank you letter and deliver it in person,' without further explanation or support. Girls, who tend to score higher on prosocial behaviors, such as helping, communicating emotions, and expressing gratitude, may have been more able, on average, to draw on their existing skills to meet these fairly complex social-emotional requests. The intervention's items

might have, therefore, typically been within the 'zone of proximal development' (Vygotsky, 1978) for girls and thus offered an optimal opportunity for skill development that effectively stretched their capacity for kindness. For boys, by contrast, the items might have been more likely to be beyond their 'zone of proximal development.' When educational activities are too challenging for students, students do not learn as effectively and may experience anxiety (Csikszentmihalyi, 1988; Vygotsky, 1978). If it is true that boys, on average, have fewer psychological resources to draw on in certain social-emotional domains and more difficulty expressing kindness in the ways specified by the *Spread Kindness Like Confetti* intervention, then it is possible that the reported increase in anxiety could be due to awkwardness and uncertainty in acquiring new complex skills. While further research is needed to explore this hypothesis, it is also possible that boys' raised anxiety may be temporary. Research shows that when students build challenging new skills, they may temporarily experience raised anxiety, which then dissipates as they master the skills (Bidell & Fischer, 2016). This would suggest that boys might need more support in acquiring related psychological resources and/or more time to assimilate learning in this type of kindness intervention relative to girls.

In this study, half of our sample came from coeducational schools and half of our sample came from single-sex schools so it is worth considering the possibility that the gender differences in the impact of this intervention could be partially moderated by the cultural specificities of single-sex schools as well. However, research broadly suggests that school type is generally not a key determinant of student outcomes (Chen et al., 2021; Clavel & Flannery, 2023; Pahlke et al., 2014). Moreover, while literature specifically on whether intervention effects vary by school type is scarce, we did find one study on this, which explored a school-based body image intervention for girls, and this study did not find significant differences in effectiveness between single-sex and coeducational settings (Dunstan et al., 2017). Further, in our study, randomization was conducted at the school level, and we matched classrooms based on the proportion of boys and girls and age to minimize potential biases related to school composition. Taken together, the lack of evidence supporting school type as a decisive factor in intervention effectiveness and our methodological approach make it more plausible that other factors explain the differences in the impact of this intervention found in our study. Since the size of our sample only gives us a 30% chance of detecting a small impact of this intervention and character interventions often have small impacts (Bates-Krakoff et al., 2022; Ghielen et al., 2018; White et al., 2019), it is possible that this intervention may have had a small impact on boys' kindness that were not detected. In addition, the effect sizes of the results we did find were modest. With this, further research is needed to fully understand the impact of the *Spread Kindness Like Confetti* intervention.

Future research directions

We recommend that future research takes into account potential differences in the perceptions and performances of kindness between boys and girls in the design of kindness interventions. More broadly, we note that the vast majority of researched character interventions have used a standardized, one-size-fits-all approach (Brown et al., 2023; Diggs & Akos, 2016; Jakubowski-Tungyoo & Jeynes, 2018; Lavy, 2020). The benefits of differentiated instruction for teaching academic subjects, such as reading

or math, are well established (Aguhayon et al., 2023; Little et al., 2021; Magableh & Abdullah, 2021; Prast et al., 2015). How might we consider differentiating instruction in teaching character skills as well?

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Author contributions

C Hinton, C Caro Samada, O de Gregorio and PA de la Rosa contributed to the study conception and design. Material preparation and data collection were performed by C Hinton, C Caro Samada, and O de Gregorio. Analyses were performed by PA de la Rosa and O de Gregorio. The first draft of the manuscript was written by C Hinton, F Moller, SS Okuzono. B Hill and PA de la Rosa. All authors read and approved the final manuscript.

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Ethics approval

The study was approved by the Comité de Ética de Investigación from Universidad Internacional de la Rioja.

Informed consent

For this study, participants were fully informed about the research objectives, procedures, and potential risks. The project included informed consents for the students in the intervention groups, and passive consents for those who did not carry out any type of intervention and for whom there was no contraindication or problem associated with answering questionnaires. To this end, the educational centers themselves were the recipients and custodians of these consents during the study period.

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Data availability statement

The datasets generated and analyzed during the current study are not publicly available but are available from the corresponding author upon reasonable request.

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Appendix A

Spread Kindness Like Confetti Scavenger Hunt

Being kind supports our well-being and helps us have positive relationships with others. We will play a *Spread Kindness Like Confetti Scavenger Hunt*! You will check off acts of kindness in the checklist below that you did, experienced, or observed. Try to check off as many as possible!

Do acts of kindness

- Share with someone
- Encourage someone when they are struggling
- Give someone a hug
- Make a handmade present for someone
- Stand up for someone
- Make someone laugh
- Help a classmate learn something
- Make a friend a thank you card or send a friend a thank you message
- Make a teacher a thank you card or tell them thank you
- Make someone who works in the dining hall a thank you card
- Thank a caretaker or cleaner for doing their job
- Hold a door for someone
- Give a compliment to a friend

- Give a compliment to a teacher
- Give a compliment to someone you have not spoken to before
- Offer help to a classmate
- Offer help to a school staff member
- Thank a school leader that you respect for doing their job well
- Smile at someone you haven't spoken with before
- Sit with someone who is sitting alone
- Patiently let someone go first
- Help someone clean up
- Introduce two people who you think would get along
- Create a sticky note with something that you're grateful for about someone and put it in a place where they'll see it
- Help someone carry something
- Give your friend or teacher a sweet or chocolate
- Thank your teacher for helping you learn something
- When a friend shares good news, celebrate with them
- Tell a family member you love them
- Volunteer for a social cause you care about
- If you notice that someone looks sad, ask them how they're doing
- Tell your friend something that you appreciate about their personality
- Make someone a cup of tea or coffee
- Write someone a thank you letter and deliver it in person
- Offer words of encouragement to a friend or family member who is struggling with something
- Invite someone to have lunch with you that you haven't had lunch with before
- Text your friend an uplifting quote
- When you feel annoyed or angry at someone, before you react, pause and try to imagine what they are thinking or feeling
- Cheer up a friend
- Tell a friend that they are a good friend
- When someone makes a mistake, respond with compassion or kindness
- Make food for someone in your family
- Look for the good in someone you don't always get along with
- When you listen to a friend or classmate, give them your full attention
- Thank a friend's parents or guardians for inviting you to their home or including you in an activity
- Donate something to someone in need
- Forgive someone who hurt you in the past
- Write a teacher from a previous school year a thank you note and give it to them
- Thank someone who supported you
- Ask an older person to share a story about when they were your age
- Thank your parents or guardians for taking care of you when you were a baby or young child
- When someone expresses feeling overwhelmed or stressed, ask if there is anything you can do to help
- Notice if a classmate is left out of an activity and invite them to join
- Say something kind to someone you don't always get along with
- Choose your own act of kindness: _____
- Choose your own act of kindness: _____
- Choose your own act of kindness: _____
- Choose your own act of kindness: _____
- Choose your own act of kindness: _____

Notice acts of kindness

- Someone helps you learn something
- Someone shares with you
- A staff member at your school helps you by doing their job
- When you walk into your school, think about all of the people who built your school building and the effort they put into creating this place for you to learn
- Someone sends you an uplifting message
- Someone gives you a hug
- Someone smiles at you
- Someone offers you help
- When you eat a meal, think about all of the people who farmed the food you're eating and think about what you would say to thank them if you could
- Someone cheers you up
- Someone holds a door for you
- Someone makes you laugh
- Someone cooks for you
- Someone asks how you are
- Someone listens to you with their full attention
- Someone introduces you to someone new
- Someone shares helpful advice
- Some makes you a homemade gift or card
- Someone forgives you
- Someone thanks you
- Reflect on all of the people in your life who love you
- For one day, write down every time someone helps you by doing their job
- When you make a mistake, someone responds with compassion or kindness
- Someone compliments you
- When you get dressed, think about all of the people who made your clothing and think about what you would say to thank them if you could
- When you use technology, reflect on all of the people who spent time inventing it
- Reflect on everything your parents or guardians have done for you from when you were little
- Think about the teacher(s) who helped you learn to read and wish them well
- When you do a fun activity that requires some skill, such as playing a sport, creating art, or playing a musical instrument, think of all of the people who helped you learn that skill and wish them well
- A school leader does something to make school better for you and your classmates
- Choose an act of kindness that you experienced: _____
- Choose an act of kindness that you experienced: _____
- Choose an act of kindness that you experienced: _____
- Choose an act of kindness that you experienced: _____
- Choose an act of kindness that you experienced: _____
- Someone helps someone you love
- A student helps another student carry something
- A teacher makes someone laugh
- A student makes someone laugh
- A school staff cooks for members of the school community
- A school staff cleans for members of the school community
- A classmate tells another classmate a positive comment
- Someone makes someone else tea or coffee
- A friend gives another friend a hug
- Someone goes out of their way to help someone else
- A student holds a door for someone
- A teacher helps someone learn something

- A member of your school community compliments someone
- Someone patiently lets someone else go ahead of them
- Someone shows patience with someone else
- Someone shows someone else compassion or kindness
- Someone listens to someone else
- A teacher thanks someone
- A student thanks a teacher
- Choose an act of kindness that you observed: _____
- Choose an act of kindness that you observed: _____
- Choose an act of kindness that you observed: _____
- Choose an act of kindness that you observed: _____
- Choose an act of kindness that you observed: _____

Spread Kindness Like Confetti Journal Reflection

Each week, your teacher will lead the following 20-minute reflection about the kind acts you are doing, experiencing, and observing in your Spread Kindness Like Confetti Scavenger Hunt.

Please answer the following questions about the Spread Kindness Like Confetti Scavenger Hunt in your journal:

(1) Think of your favorite act of kindness that you did, experienced, or observed as part of the Spread Kindness Like Confetti Scavenger Hunt in the past week. Please describe what happened in as much detail as possible (e.g., who, what, where, when, etc.).
(2) After this act of kindness . . . (please check all that apply)
   - I felt more grateful
   - I was inspired to be more kind
   - I focused more on seeing the good in others
   - I felt more love for others
   - I felt closer to my teachers
   - I felt closer to my friends
   - I felt closer to my classmates
   - I felt less lonely
   - I felt less sad
   - I felt less worried
   - I felt happier
   - I felt more meaning and purpose in my life
   - It helped me grow into a better person
   - I felt healthier
(3) Please choose **one** option that you checked above, and explain *how* the act of kindness had that impact on you.
(4) Please choose **one** question from the list below to answer.
   - Why was this your favorite act of kindness?
   - What are you grateful for in this act of kindness?
   - How did it impact the relationship(s) of those involved?
   - How did it make you feel?
   - How do you think the others involved in this act of kindness felt? How do you think it impacted them?
   - Did this act of kindness inspire you to be more kind? If so, how?
   - Would you like to do acts of kindness like this more often in the future? If so, why?

(15 minutes)

Following this, your teacher will invite you to share the act of kindness you wrote about with your classmates if you would like to.

(3 minutes)
As a closing, your teacher will invite you to set an intention to go out of your way this week to be kind to someone close to you, a friend, a classmate, someone you see as different from you, or someone you find difficult.
(1 minute)