1

International REACH Forgiveness Intervention: A Multi-Site Randomised Controlled Trial

SUPPLEMENTAL MATERIAL

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Text 1

Primary Outcomes

Unforgiveness

Participants completed the Transgression-Related Interpersonal Motivations Inventory-18 item form (TRIM-18; McCullough et al., 1998), which contains 18 items that measure the motivations—revenge, avoidance, benevolence—assumed to underlie forgiveness. After describing a past event in which they were hurt by another person, participants responded to each item by reflecting on the person who had hurt them (e.g., "I'll make him or her pay"). Items are rated using a five-point response format (1 = Strongly disagree; 5 = Strongly agree). In this study, we reverse scored responses to the benevolence items and then averaged responses to all items for an index of unforgiveness. Higher scores indicate greater unforgiveness.

Depression and Anxiety Symptoms

Participants responded to the anxiety and depression subscales of the Brief Symptom Inventory-18 (BSI-18; Derogatis, 2001). Each subscale contains six items that assess the severity of anxiety (e.g., "Nervousness or shakiness inside") and depression (e.g., "Feeling no interest in things") symptoms experienced during the past seven days. A five-point response format is used to rate each item ($0 = Not \ at \ all$; 4 = Extremely). Relevant items were averaged for indices of depression and anxiety symptoms, respectively, with higher scores reflecting greater psychological distress.

Secondary Outcomes

Decisional Forgiveness

Participants completed the Decision to Forgive Scale (DTFS; Davis et al., 2015). The DTFS includes six items that measure the extent to which participants have made a decision to

INTERNATIONAL REACH FORGIVENESS INTERVENTION

forgive someone who has transgressed against them (e.g., "I have decided to forgive him or her"). Participants responded to the DTFS by reflecting on the same hurt they described and thought about when completing the TRIM-18. A five-point response scale is used to rate each of the items (1 = Strongly disagree; 5 = Strongly agree). Responses to the items are averaged for a total score. Higher scores indicate greater decisional forgiveness.

Forbearance

The tendency to exhibit forbearance was measured using Forbearance Scale-Short Form (FS-SF; Ho, 2022). The FS-SF consists of eight items (e.g., "I don't take others' faults to heart") that are rated using a six-point response scale (1 = Strongly disagree; 6 = Strongly agree).

Responses to the items are averaged, such that higher scores denote greater forbearance.

Secure Flourishing

Participants completed the Secure Flourishing Index (SFI; VanderWeele, 2017). The SFI is comprised of 12 questions and statements (e.g., "Overall, how satisfied are you with life as a whole these days?") that provide a broad assessment of well-being across 6 domains: (1) happiness & life satisfaction, (2) mental & physical health, (3) meaning & purpose, (4) character & virtue, (5) close social relationships, and (6) financial & material stability. Items are rated on an 11-point response scale (from 0 to 10), with orienting labels presented alongside anchor points. Responses to the 12 items were averaged for an index of secure flourishing. Higher scores imply greater levels of secure flourishing.

Trait Forgivingness

Trait Forgivingness Scale (TFS; Berry et al., 2005) was used to assess trait forgivingness. The TFS consists of 10 items that assess an individual's tendency to forgive others across time and situations (e.g., "I am a forgiving person"). Items are rated using a five-point response

4

format (1 = Strongly disagree; 5 = Strongly agree). Items were averaged for a total score, with higher scores reflecting a greater propensity to forgive others.

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S1

Baseline Sociodemographic Characteristics of Colombia Site Participants in the Immediate- and Delayed-treatment Groups

Characteristics	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 1,177)	(n = 596)	(n = 581)
Age (years), Mdn (IQR)	23 (20, 35)	23 (20, 34)	23 (20, 35)
Gender, n %			
Female	868 (74%)	446 (75%)	422 (73%)
Male	303 (26%)	145 (24%)	158 (27%)
Other	6 (< 1%)	5 (< 1%)	1 (< 1%)
Education, <i>n</i> %			
Some secondary education or below	200 (17%)	102 (17%)	98 (17%)
Completed secondary education	665 (56%)	343 (58%)	322 (55%)
Some postsecondary education or higher	311 (26%)	150 (25%)	161 (28%)
Not reported	1 (< 1%)	1 (< 1%)	0 (0%)
Household income, <i>n</i> %			
1 standard deviation below average	617 (52%)	311 (52%)	306 (53%)
Average	422 (36%)	213 (36%)	209 (36%)
1 standard deviation above average	95 (8%)	53 (9%)	42 (7%)
3 standard deviations above average	39 (3%)	17 (3%)	22 (4%)
Not reported	4 (< 1%)	2 (< 1%)	2 (< 1%)
Religiously affiliated, <i>n</i> %			
Yes	903 (77%)	451 (76%)	452 (78%)
No	273 (23%)	145 (24%)	128 (22%)
Not reported	1 (< 1%)	0 (0%)	1 (< 1%)
Marital status, n %			,
Divorced	8 (< 1%)	4 (< 1%)	4 (< 1%)
In a relationship	422 (36%)	212 (36%)	210 (36%)
Married	593 (50%)	298 (50%)	295 (51%)
Single	133 (11%)	71 (12%)	62 (11%)
Widowed	18 (2%)	10 (2%)	8 (1%)
Not reported	3 (< 1%)	1 (< 1%)	2 (< 1%)

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S2

Baseline Sociodemographic Characteristics of Hong Kong Site Participants in the Immediate- and Delayed-treatment Groups

	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 398)	(n = 199)	(n = 199)
Age (years), Mdn (IQR)	38 (28, 48)	38 (27.5, 46)	38 (28, 49)
Gender, n %			
Female	303 (76%)	153 (77%)	150 (75%)
Male	93 (23%)	45 (23%)	48 (24%)
Not reported	2 (< 1%)	1 (< 1%)	1 (< 1%)
Race/ethnicity, n %			
Asian	398 (100%)	199 (100%)	199 (100%)
Education, n %			
Some secondary education or below	12 (3%)	6 (3%)	6 (3%)
Completed secondary education	116 (29%)	47 (24%)	69 (35%)
Some postsecondary education or higher	264 (66%)	144 (72%)	120 (60%)
Not reported	6 (2%)	2 (1%)	4 (2%)
Household income, n %	. ,		
1 standard deviation below average	145 (36%)	68 (34%)	77 (39%)
Average	192 (48%)	96 (48%)	96 (48%)
1 standard deviation above average	42 (11%)	25 (13%)	17 (9%)
Not reported	19 (5%)	10 (5%)	9 (5%)
Religiously affiliated, <i>n</i> %	, ,	, ,	
Yes	189 (47%)	93 (47%)	96 (48%)
No	207 (52%)	105 (53%)	102 (51%)
Not reported	2 (< 1%)	1 (< 1%)	1 (< 1%)
Marital status, <i>n</i> %			
Divorced	23 (6%)	10 (5%)	13 (7%)
In a relationship	43 (11%)	18 (9%)	25 (13%)
Married	208 (52%)	100 (50%)	108 (54%)
Separated	3 (< 1%)	3 (2%)	0 (0%)
Single	106 (27%)	59 (30%)	47 (24%)
Widowed	9 (2%)	4 (2%)	5 (3%)
Not reported	6 (2%)	5 (3%)	1 (< 1%)

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S3

Baseline Sociodemographic Characteristics of Indonesia Site Participants in the Immediate- and Delayed-treatment Groups

	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 659)	(n = 333)	(n = 326)
Age (years), Mdn (IQR)	21 (20, 22)	21 (20, 22)	21 (20, 22)
Gender, n %			
Female	539 (82%)	269 (81%)	270 (83%)
Male	119 (18%)	64 (19%)	55 (17%)
Other	1 (< 1%)	0 (0%)	1 (< 1%)
Race/ethnicity, n %			
Asian	658 (> 99%)	333 (100%)	325 (> 99%)
Not reported	1 (< 1%)	0 (0%)	1 (< 1%)
Education, n %			, ,
Some secondary education or below	27 (4%)	12 (4%)	15 (5%)
Completed secondary education	392 (59%)	193 (58%)	199 (61%)
Some postsecondary education or higher	240 (36%)	128 (38%)	112 (34%)
Household income, n %	` ,	,	,
1 standard deviation below average	125 (19%)	60 (18%)	65 (20%)
Average	283 (43%)	143 (43%)	140 (43%)
1 standard deviation above average	119 (18%)	57 (17%)	62 (19%)
3 standard deviations above average	132 (20%)	73 (22%)	59 (18%)
Religiously affiliated, n %	` ,		
Yes	659 (100%)	333 (100%)	326 (100%)
Marital status, n %	, ,		
Divorced	1 (< 1%)	0 (0%)	1 (< 1%)
In a relationship	168 (25%)	87 (26%)	81 (25%)
Married	12 (2%)	2 (< 1%)	10 (3%)
Single	476 (72%)	242 (73%)	234 (72%)
Widowed	2 (< 1%)	2 (< 1%)	0 (0%)

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S4

Baseline Sociodemographic Characteristics of South Africa Site Participants in the Immediate- and Delayed-treatment Groups

Characteristic	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 913)	(n = 463)	(n = 450)
Age (years), Mdn (IQR)	24 (21, 29)	25 (21, 29)	24 (21, 28)
Gender, n %			
Female	665 (73%)	331 (71%)	334 (74%)
Male	248 (27%)	132 (29%)	116 (26%)
Race/ethnicity ^a , n %			
Black African	882 (97%)	446 (96%)	436 (97%)
Coloured	21 (2%)	12 (3%)	9 (2%)
Indian	2 (< 1%)	1 (< 1%)	1 (< 1%)
White	6 (< 1%)	4 (< 1%)	2 (< 1%)
Other	2 (< 1%)	0 (0%)	2 (< 1%)
Education, <i>n</i> %	. ,		
Some secondary education or below	82 (9%)	45 (10%)	37 (8%)
Completed secondary education	528 (58%)	244 (53%)	284 (63%)
Some postsecondary education or higher	303 (33%)	174 (38%)	129 (29%)
Household income, n %			
1 standard deviation below average	360 (39%)	170 (37%)	190 (42%)
Average	362 (40%)	192 (41%)	170 (38%)
1 standard deviation above average	168 (18%)	89 (19%)	79 (18%)
3 standard deviations above average	23 (3%)	12 (3%)	11 (2%)
Religiously affiliated, n %			
Yes	857 (94%)	438 (95%)	419 (93%)
No	36 (4%)	17 (4%)	19 (4%)
Not reported	20 (2%)	8 (2%)	12 (3%)
Marital status, n %			
Divorced	11 (1%)	4 (< 1%)	7 (2%)
In a relationship	211 (23%)	116 (25%)	95 (21%)
Married	52 (6%)	29 (6%)	23 (5%)
Separated	4 (< 1%)	2 (< 1%)	2 (< 1%)
Single	630 (69%)	310 (67%)	320 (71%)
Widowed	5 (< 1%)	2 (< 1%)	3 (< 1%)

Note. Mdn = median, IQR = interquartile range. Cumulative percentages may not add up to 100% due to rounding. ^aRace/ethnicity categories were adopted from Statistics South Africa (2016) to maintain consistency with general reporting practices on race in South Africa.

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S5

Baseline Sociodemographic Characteristics of Ukraine (Site 1) Participants in the Immediate- and Delayed-treatment Groups

Chamatanistia	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 759)	(n = 379)	(n = 380)
Age (years), Mdn (IQR)	38 (29, 47)	37 (29, 47)	38 (30, 46)
Gender, n %			
Female	530 (70%)	252 (66%)	278 (73%)
Male	229 (30%)	127 (34%)	102 (27%)
Education, n %			
Some secondary education or below	12 (2%)	2 (< 1%)	10 (3%)
Completed secondary education	53 (7%)	25 (7%)	28 (7%)
Some postsecondary education or higher	694 (91%)	352 (93%)	342 (90%)
Household income, n %			
1 standard deviation below average	205 (27%)	110 (29%)	95 (25%)
Average	283 (37%)	138 (36%)	145 (38%)
1 standard deviation above average	160 (21%)	80 (21%)	80 (21%)
3 standard deviations above average	111 (15%)	51 (13%)	60 (16%)
Religiously affiliated, n %			
Yes	446 (59%)	219 (58%)	227 (60%)
No	313 (41%)	160 (42%)	153 (40%)
Marital status, n %			
Divorced	86 (11%)	39 (10%)	47 (12%)
In a relationship	80 (11%)	45 (12%)	35 (9%)
Married	350 (46%)	178 (47%)	172 (45%)
Separated	16 (2%)	7 (2%)	9 (2%)
Single	181 (24%)	91 (24%)	90 (24%)
Widowed	46 (6%)	19 (5%)	27 (7%)

Note. Mdn = median, IQR = interquartile range. Cumulative percentages may not add up to 100% due to rounding.

Ho MY, et al. BMJPH 2024; 2:e000072. doi: 10.1136/bmjph-2023-000072

10

Supplemental Table S6

Baseline Sociodemographic Characteristics of Ukraine (Site 2) Participants in the Immediate- and Delayed-treatment Groups

Characteristic	Overall	Immediate-treatment group	Delayed-treatment group
Characteristic	(n = 692)	(n = 320)	(n = 372)
Age (years), Mdn (IQR)	36 (27, 45)	35 (28, 45)	36 (27, 45)
Gender, <i>n</i> %			
Female	495 (72%)	227 (71%)	268 (72%)
Male	197 (28%)	93 (29%)	104 (28%)
Race/ethnicity, n %			
White	692 (100%)	320 (100%)	372 (100%)
Education, <i>n</i> %			
Some secondary education or below	256 (37%)	120 (38%)	136 (37%)
Completed secondary education	436 (63%)	200 (62%)	236 (63%)
Household income, <i>n</i> %			
1 standard deviation below average	283 (41%)	138 (43%)	145 (39%)
Average	267 (39%)	128 (40%)	139 (37%)
1 standard deviation above average	102 (15%)	41 (13%)	61 (16%)
3 standard deviations above average	40 (6%)	13 (4%)	27 (7%)
Religiously affiliated, n %			
Yes	479 (69%)	215 (67%)	264 (71%)
No	213 (31%)	105 (33%)	108 (29%)
Marital status, <i>n</i> %			
Divorced	71 (10%)	36 (11%)	35 (9%)
In a relationship	63 (9%)	31 (10%)	32 (9%)
Married	317 (46%)	145 (45%)	172 (46%)
Separated	13 (2%)	5 (2%)	8 (2%)
Single	202 (29%)	93 (29%)	109 (29%)
Widowed	26 (4%)	10 (3%)	16 (4%)

11

Supplemental Table S7

Raw Means and Standard Deviations of Primary Outcomes by Wave of Data Collection and Treatment Group

Characteristic	T_1	T_2	T ₃
Unforgiveness			
All participants	50.74 (15.95)	44.36 (16.29)	39.91 (14.26)
Immediate-treatment group	50.37 (16.00)	39.37 (14.95)	39.44 (14.12)
Delayed-treatment group	51.11 (15.89)	48.99 (16.12)	40.38 (14.39)
Depression symptoms			
All participants	8.69 (6.23)	6.89 (5.97)	5.16 (5.50)
Immediate-treatment group	8.79 (6.24)	6.09 (5.68)	5.17 (5.49)
Delayed-treatment group	8.60 (6.23)	7.64 (6.14)	5.14 (5.51)
Anxiety symptoms			
All participants	8.32 (6.62)	6.52 (6.30)	4.74 (5.66)
Immediate-treatment group	8.31 (6.59)	5.73 (6.05)	4.71 (5.64)
Delayed-treatment group	8.33 (6.66)	7.26 (6.44)	4.77 (5.68)

Note. All variables are raw sums of scale items prior to standardization.

12

Supplemental Table S8

Estimated Effectiveness of Workbook Intervention on Primary Outcomes Adjusting for Precision Covariates

Outcome	β [95% CI]	<i>p</i> -value
Unforgiveness	-0.50 [-0.54, -0.45]	< 0.001
Depression symptoms	-0.23 [-0.28, -0.18]	< 0.001
Anxiety symptoms	-0.21 [-0.26, -0.17]	< 0.001

Note. β = estimated difference in standardized primary outcome measure for the immediate-treatment vs. delayed-treatment conditions, CI = confidence interval. Precision covariates include age, gender, baseline values of all primary outcomes, and site.

13

Supplemental Table S9

Estimated Effectiveness of Workbook Intervention on Primary Outcomes Modeling Intervention Exposure as a Categorical Time-varying Effect

Outcome	β [95% CI]	<i>p</i> -value
Unforgiveness	-0.49 [-0.53, -0.45]	< 0.001
Depression symptoms	-0.24 [-0.29, -0.19]	< 0.001
Anxiety symptoms	-0.22 [-0.27, -0.17]	< 0.001

Note. β = estimated difference in standardized primary outcome measure for the immediate-treatment vs. delayed-treatment conditions, CI = confidence interval.

14

Supplemental Table S10

Estimated Effectiveness of Workbook Intervention on Primary Outcomes Modeling Intervention Exposure as a Continuous Time-varying Effect

Outcome	β [95% CI]	<i>p</i> -value
Unforgiveness	-0.49 [-0.53, -0.45]	< 0.001
Depression symptoms	-0.24 [-0.29, -0.19]	< 0.001
Anxiety symptoms	-0.22 [-0.27, -0.17]	< 0.001

Note. β = estimated difference in standardized primary outcome measure for the immediate-treatment vs. delayed-treatment conditions, CI = confidence interval.

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Table S11

Assessment of Treatment Effect Modification for Primary Outcomes by Baseline Trait

Forgivingness	and	Site
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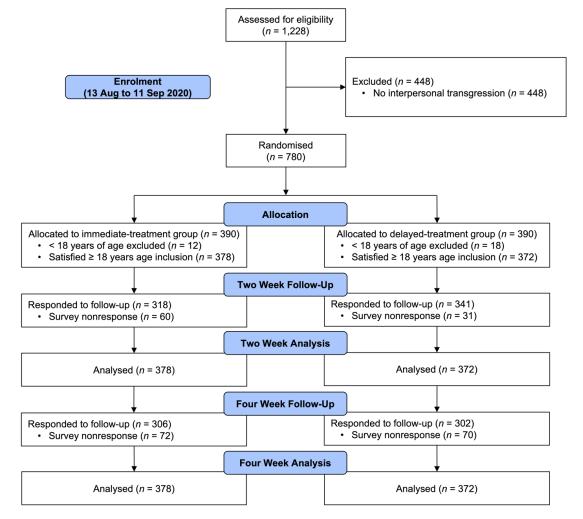
Outcome Outcome	β [95% CI]	<i>p</i> -value
Unforgiveness		
Baseline trait forgivingness		
High	0.12* [0.01, 0.24]	0.041
Site		
Hong Kong	0.15 [-0.04, 0.35]	-
Indonesia	-0.13 [-0.31, 0.05]	-
South Africa	0.30 [0.12, 0.47]	-
Ukraine site 1	-0.19 [-0.38, -0.01]	-
Ukraine site 2	-0.05 [-0.23, 0.14]	-
Depression symptoms		
Baseline trait forgivingness		
High	0.16* [0.04, 0.28]	0.016
Site		
Hong Kong	0.12 [-0.09, 0.33]	-
Indonesia	-0.03 [-0.22, 0.17]	-
South Africa	0.27 [0.08, 0.45]	-
Ukraine site 1	-0.08 [-0.26, 0.09]	-
Ukraine site 2	0.00 [-0.18, 0.19]	-
Anxiety symptoms		
Baseline trait forgivingness		
High	0.16* [0.04, 0.28]	0.010
Site		
Hong Kong	0.09 [-0.12, 0.30]	-
Indonesia	-0.01 [-0.21, 0.18]	-
South Africa	0.17 [-0.01, 0.35]	-
Ukraine site 1	-0.13 [-0.31, 0.04]	-
Ukraine site 2	-0.02 [-0.21, 0.16]	-

Note. β = estimated standardized difference in intervention effectiveness for participants with vs. without the effect modifier variable, or estimated effectiveness for participants with specified level of effect modifier, CI = confidence interval. *p < 0.05 before but not after Bonferroni-Holm correction for all secondary tests reported in Table 3 and Figure 2 (the p-value cutoff for Bonferroni-Holm correction was 0.05/10 = 0.005).

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S1

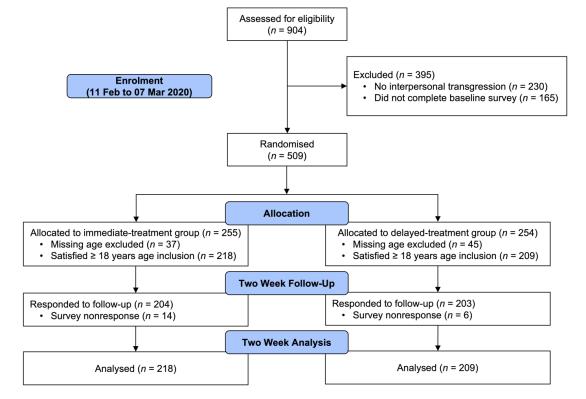
CONSORT Flow Diagram of Colombian Student Participants Included in the Study.



INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S2

CONSORT Flow Diagram of Colombian War Survivor Participants Included in the Study.

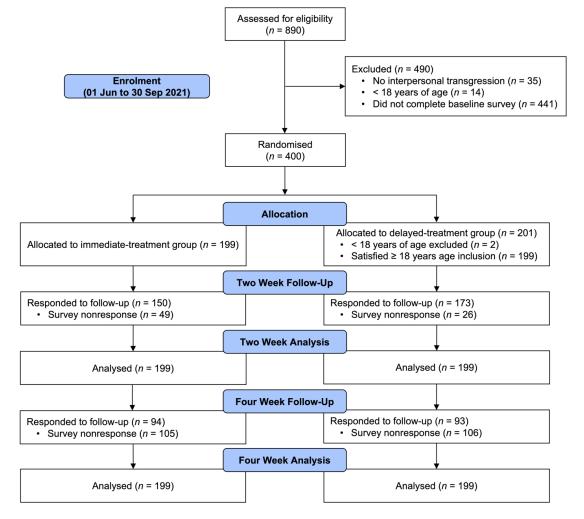


Ho MY, et al. BMJPH 2024; 2:e000072. doi: 10.1136/bmjph-2023-000072

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S3

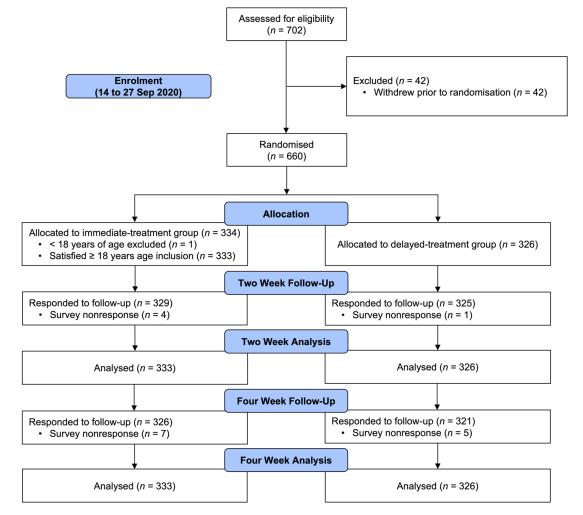
CONSORT Flow Diagram of Hong Kong Participants Included in the Study.



INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S4

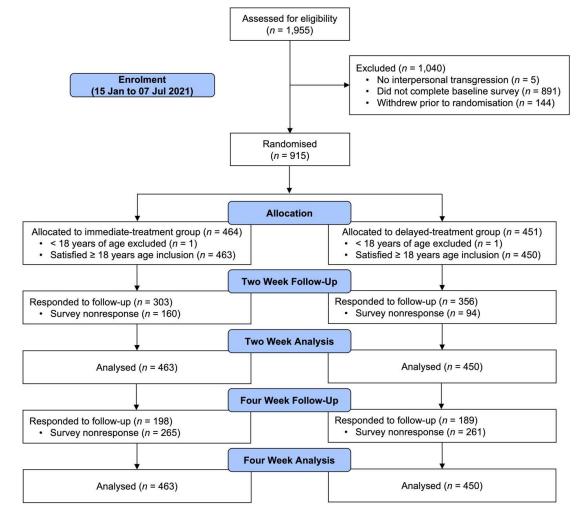
CONSORT Flow Diagram of Indonesian Participants Included in the Study.



INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S5

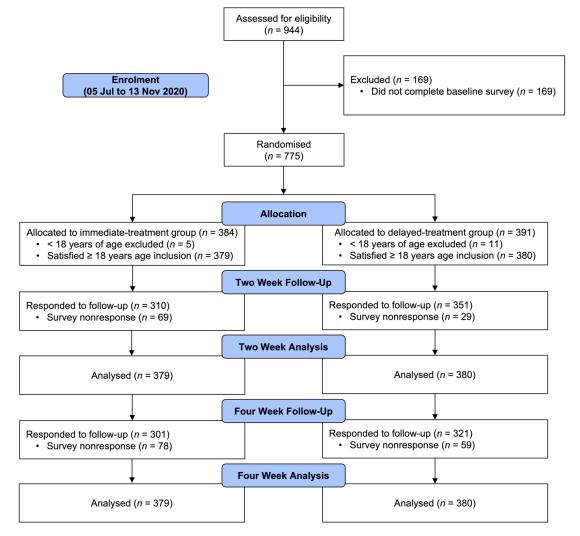
CONSORT Flow Diagram of South African Participants Included in the Study.



INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S6

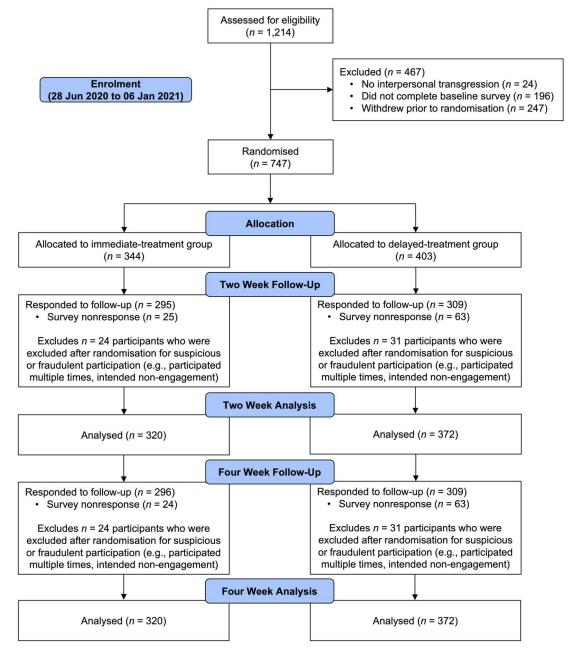
CONSORT Flow Diagram of Ukraine Site 1 Participants Included in the Study.



22

Supplemental Figure S7

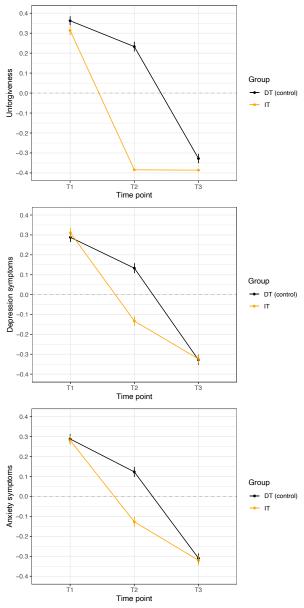
CONSORT Flow Diagram of Ukraine Site 2 Participants Included in the Study.



INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S8

Means and Standard Errors of Primary Outcomes at Each of the Three Timepoints for the Immediate-treatment and Delayed-treatment Groups

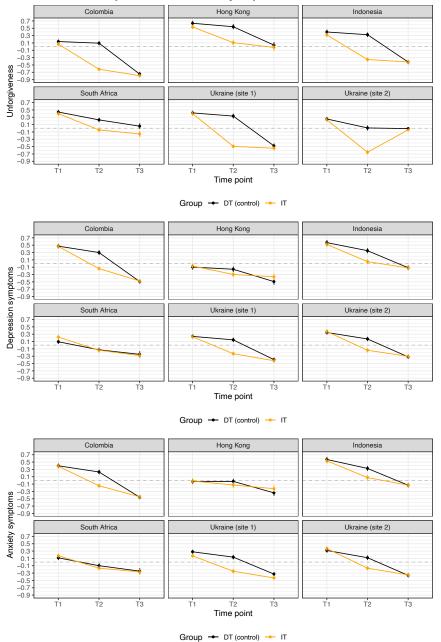


Note. DT = delayed-treatment, IT = immediate-treatment.

INTERNATIONAL REACH FORGIVENESS INTERVENTION

Supplemental Figure S9

Means and Standard Errors of Primary Outcomes at Each of the Three Timepoints for the Immediate-treatment and Delayed-treatment Groups by Site



Note. DT = delayed-treatment, IT = immediate-treatment.

INTERNATIONAL REACH FORGIVENESS INTERVENTION

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