

A Randomized Clinical Trial of Online Social Intelligence Training With Custodial Grandmothers

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Decision Editor: Joseph E. Gaugler, PhD, FGSA

Abstract

Background and Objectives: In this study, we investigated the efficacy of a self-administered, online Social Intelligence Training (SIT) program aimed at enhancing psychological and relational well-being among a nationwide U.S. sample of custodial grandmothers.

Research Design and Methods: A two-arm randomized clinical trial (RCT) was conducted, where 349 grandmothers raising grandchildren aged 11–18 years were assigned to either SIT or an attention control condition (ACC). Participants self-completed online surveys at baseline and immediately postintervention, in addition to follow-ups at 3-, 6-, and 9-month postintervention. First-order latent difference score models were used to compare SIT to ACC, across all times of measurement, along key indicators of psychological and relational well-being on an intent-to-treat basis.

Results: Although SIT was largely superior to ACC at yielding positive results, it appears that it attenuated longitudinal declines that occurred among ACC participants. SIT also exerted stronger effects on relational than psychological outcomes, with perceived relations with grandchildren being the most positively affected.

Discussion and Implications: Given that the historical time of this RCT unpredictably corresponded with the coronavirus disease 2019 pandemic, we suspect that SIT helped offset declines in psychological and relational well-being that are widely documented to have resulted from the pandemic. Our overall positive findings support future use of the inexpensive and easily delivered SIT program under normal environmental conditions, with the vulnerable and geographically disperse population of custodial grandmothers.

Clinical Trials Registration Number: NCT03239977

Keywords: COVID-19 pandemic, Kinship care, Psychological and relational outcomes, Short- and long-term efficacy

Custodial grandmothers caring for grandchildren as parental surrogates due to parental difficulties have been studied extensively by gerontologists (e.g., Hayslip et al., 2017). Prior research has primarily focused on grandmothers, because only 1% of custodial grandparent households are headed by lone grandfathers (US Census Bureau, 2016) and grandmothers typically provide the most childcare, even within two grandparent households. Despite mounting evidence that custodial grandmothers are at greater risk for mental and physical health difficulties than their noncaregiving age peers (e.g., Danielsbacka et al., 2022; Kelley et al., 2021), research on efficacious interventions to support these caregivers has been scarce and consists mainly of studies lacking in rigor with inconclusive findings (see Dolbin-MacNab, 2020). To address this knowledge gap, the present attention-controlled,

randomized clinical trial (RCT) investigated the efficacy of a self-administered, online Social Intelligence Training (SIT) program at improving indicators of psychological and relational well-being across repeated times of measurement up to 9-month postintervention with a nationwide U.S. sample of 349 custodial grandmothers.

Importance of Fostering Social Intelligence

Social intelligence (SI) is a fluid ability organized around cognitive principles that permit accurate judgment and wise choices in one's social interactions, knowledge of processes underlying social development, and a commitment to curbing prejudice toward others (Castro & Zautra, 2016; Kihlstrom & Cantor, 2011). Socially intelligent individuals understand

Received: January 5 2023; Editorial Decision Date: June 2 2023.

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how the mind develops based upon social expectations and schemas from past experiences and know how to overcome past difficulties to create and maintain positive social bonds. Fortunately, social-emotional skills like SI can be modified through intervention programs that encourage active self-reflection and intentional activities, especially for those who have experienced childhood adversity (Davidson & McEwen, 2012).

The relevance of SI to custodial grandmothers is suggested by the risky family model, which outlines how the diminished ability for developing and maintaining the kinds of social ties that are transmitted across generations could facilitate poorer mental and physical health across the life span (Repetti et al., 2002). Environmental forces within risky families exacerbate genetic predispositions, leading to deficits in social competencies as well as physiological and neuroendocrine disturbances, with adverse long-term effects (Repetti et al., 2002). The development of SI and supportive relationships outside the family are thus compromised by growing up in environments where social skills are poorly modeled by caregivers. Such experiences also contribute to faulty social information-processing rules and biases, and to mental representations of self and others that interfere with positive social interactions and maintaining healthy relationships (Muller et al., 2012). Importantly, custodial grandmothers often have numerous factors associated with risky families including a higher incidence of adverse childhood experiences (ACEs; Smith et al., 2023), poverty, and other family disruptions (Hayslip et al., 2017).

The overall importance of SI in the lives of custodial grandmothers is further suggested by Shorey and Ng's (2022) social-ecological model (SEM) of grandparenting, which holds that their well-being is influenced by layers of intrapersonal (e.g., knowledge, attitudes, behaviors, self-concepts), interpersonal (e.g., social networks, support systems, meaningful relationships), and organizational (e.g., institutions or organizations with rules and regulations) factors, along with community and public policy factors. The interrelated nature of these factors underscores that higher SI may be an important intrapersonal resilience factor that facilitates custodial grandmother's ability to navigate the other layers of the SEM as they relate to the unique challenges of custodial grandparenting (Hayslip & Smith, 2013; Shorey & Ng, 2022). Specifically, SI can empower them to establish and maintain healthier relationships with their grandchild, other family members, and friends (interpersonal); to interact more effectively with schools and social services that enhance grandmother and grandchild well-being (organizational); and to advocate for needed services and policies on behalf of custodial grandfamilies (community and public policy). Along these lines, the risky family model, referenced previously, holds that social skills and knowledge are integral to life-long mental and physical health because they facilitate the enlistment of positive social ties that lower stress, raise self-esteem, and become sources of social support (Repetti et al., 2002). These resources may be key to promoting more positive outcomes in custodial grandmothers.

The Present Study

Despite the potential of SI as a resilience factor in the lives of custodial grandmothers, along with strong evidence of risk for social deficits among those who have encountered ACEs

and risky environmental factors, no interventions to date have explicitly targeted custodial grandmothers' socioemotional skills. To address this knowledge gap, we conducted a two-arm RCT comparing the effectiveness of SIT to an attention control condition (ACC) for a variety of indicators of grandmothers' psychological and relational well-being. The RCT was self-administered online to a nationwide U.S. sample of 349 custodial grandmothers. The SIT was designed to broaden awareness of processes underlying social development and interactions (Kihlstrom & Cantor, 2011), and to modify key socioemotional skills (e.g., emotional awareness, perspective-taking) regarding how people engage with others (Masi et al., 2011). It was also designed to target implicit mindsets and encourage the view that social-emotional capacities (e.g., perspective taking and emotional awareness) are modifiable with effort (Schumann et al., 2014). A prior RCT with 230 middle-aged adults indicated that SIT improved daily socioemotional skills, social connection, negative affect, and emotion regulation in the context of everyday events (Castro et al., 2019, 2023). In that study, it was additionally found that participants who reported more ACEs at baseline exhibited the strongest benefits associated with SIT, supporting the use of SIT with individuals having histories of risk.

In the current study, we hypothesized that, for grandmothers in the SIT condition versus those assigned to ACC, changes in SI skills and knowledge would yield greater reductions in psychological distress and loneliness as well as improvements in self-esteem, prosocial behavior, and relationship quality with grandchildren and peers. These are salient outcomes in view of evidence that custodial grandmothers are at risk for compromised mental health (Kelley et al., 2021), social isolation and loneliness, diminished self-esteem, and disrupted interpersonal relationships (Choi et al., 2016; Hayslip et al., 2017; Kelley et al., 2021).

Method

Participants

Although 440 of 753 (58%) of initially contacted grandmothers met study inclusion criteria, 349 (46%) were enrolled in the RCT across 42 U.S. states. Eligibility criteria were that the grandmother was providing full-time care to at least one grandchild between the ages of 11 and 18 during the past 6 months, with neither biological parent residing in the household nor providing substantial care to grandchildren; fluent in English; and without cognitive impairment. If a grandmother was caring for multiple grandchildren between the ages of 11 and 18, then a target grandchild was identified. Recruitment involved multiple approaches (e.g., e-mails to school counselors and principals, targeted mailings, and outreach to relevant organizations and agencies). The RCT was advertised as "a study to learn how online programs can give custodial grandmothers and their grandchildren information and skills to improve health and well-being." IRB approval (#17-301) was granted by Kent State University, and informed consent and assent were obtained from all participants.

Table 1 provides sociodemographic information for the 349 participating grandmothers and target grandchildren by RCT condition. Grandmothers had a mean age of 61.4 years (standard deviation [*SD*] = 5.9), had legal custody of the target grandchild (88.8%), were unemployed (58.3%), were unmarried (56.4%), and had less than a college education (73.9%). Most grandmothers were White (73.6%), with the remainder

Table 1. Background Characteristics of Study Sample by Randomized Clinical Trial (RCT) Condition

Characteristic	Total sample (<i>n</i> = 349)	RCT condition		Test statistic
		SIT (<i>n</i> = 185)	ACC (<i>n</i> = 164)	
Grandmother age, <i>M</i> (<i>SD</i>)	61.4 (5.9)	61.4 (5.8)	61.3 (5.9)	$t(347) = 0.16$
Grandmother race by Hispanic ethnicity	<i>n</i> (%)			$\chi^2(2) = 0.67^a$ $\chi^2(1) = 0.03^b$
White non-Hispanic	246 (70.5)	131 (70.8)	115 (70.1)	
White Hispanic	11 (3.2)	5 (2.7)	6 (3.7)	
Black non-Hispanic	76 (21.8)	39 (21.1)	37 (22.6)	
Black Hispanic other	0 (0%)	0 (0)	0 (0)	
Other non-Hispanic	7 (2.0)	4 (2.2)	3 (1.8)	
Other Hispanic	9 (2.6)	6 (3.2)	3 (1.8)	
Employed <i>n</i> (%)	149 (42.7)	86 (46.5)	63 (38.4)	
Married <i>n</i> (%)	152 (43.6)	75 (40.5)	77 (47.0)	
Custody of grandchild <i>n</i> (%)	310 (88.8)	165 (89.2)	145 (88.4)	
Grandmother education	<i>n</i> (%)			$\chi^2(4) = 0.48$
Less than high school	24 (6.9)	10 (5.4)	14 (8.5)	
High school graduate	116 (33.2)	61 (33.0)	55 (33.5)	
Some college	118 (33.8)	64 (34.6)	54 (32.9)	
Bachelor's degree	54 (15.5)	33 (17.8)	21 (12.8)	
Graduate or professional	37 (10.6)	17 (9.2)	20 (12.2)	
Grandchild gender <i>n</i> (%)				$\chi^2(1) = 0.94$
Female	210 (60.2)	111 (60.0)	99 (60.4)	
Male	139 (39.8)	74 (40.0)	65 (39.6)	
Length of care (<i>n</i> [%])				$\chi^2(3) = 0.59$
<1 year	14 (4.1)	9 (5.0)	5 (3.1)	
1–4 years	84 (24.4)	42 (23.1)	42 (25.9)	
5–8 years	67 (19.5)	39 (21.4)	28 (17.3)	
>8 years	179 (52.0)	92 (50.5)	87 (53.7)	
Annual family income <i>n</i> (%) ^{b,c}				$\chi^2(4) = 0.57$
≤\$15,999	63 (18.3)	29 (15.9)	34 (20.0)	
\$16,000–\$25,999	66 (19.1)	37 (20.2)	29 (17.9)	
\$26,000–\$50,999	103 (29.9)	60 (32.4)	43 (26.5)	
\$51,000–\$75,999	58 (16.8)	29 (15.7)	29 (17.9)	
≥\$76,000	55 (15.8)	28 (15.1)	27 (16.7)	
Major reasons for care <i>n</i> (%) ^d				NA
Parental substance abuse	176 (50.4)	95 (51.4)	81 (49.4)	
Parental neglect	81 (23.2)	39 (21.1)	42 (25.6)	
Parental incarceration	65 (18.6)	32 (17.3)	33 (20.1)	
Parental unwillingness	62 (17.8)	32 (17.3)	30 (18.3)	
Parental death	57 (16.3)	31 (16.8)	26 (15.9)	
Parental mental illness	50 (14.3)	26 (14.1)	24 (14.6)	
Child abuse	44 (12.6)	25 (7.2)	19 (11.6)	
Parental abandonment	36 (10.3)	22 (6.3)	14 (8.5)	

Notes: ACC = attention control condition; *SD* = standard deviation; SIT = Social Intelligence Training.

^aTest of RCT Condition by Race.

^bTest of RCT Condition by Hispanic Origin or Not.

^cThere four cases of missing data for annual family income.

^dPercentages do not add up to 100 because reasons for care were not mutually exclusive.

identifying as Black (21.8%), or of other races (4.6%). The majority were also non-Hispanic (94.3%). Annual income was diverse, with most (67.3%) grandmothers reporting earning ≤\$50,999. Target grandchildren were largely female (60.2%) and had been in the grandmother's care for at least

8 years (52.0%). The main reasons for care were parental substance abuse (50.4%), neglect (23.2%), and incarceration (18.6%). There were no statistically significant differences in any grandmother or target grandchild sociodemographics by RCT condition.

Materials and Procedure

Participants in this parallel RCT were randomly assigned based on a single 1:1 allocation ratio procedure to either SIT ($n = 185$) or ACC ($n = 164$), using a computerized random number generator. The Project Director generated the random allocation sequence list using *random.org* and used it for assignment to RCT condition after participants were deemed to have met study eligibility criteria but had not yet provided informed consent. To avoid any potential allocation bias, there was no deviation whatsoever from the allocation sequence. There were no concerns regarding the blinding of outcome assessors or interventionists because, as described below, these tasks were objectively performed using computer technologies.

Both RCT conditions were delivered online and were accessible 24/7. Amazon tablets were provided for accessing the self-administered, online intervention and for completing study measures through Qualtrics. Nevertheless, participants could use whatever device (e.g., PC, smartphone) they wanted for the RCT. Usernames and passwords were assigned for accessing the RCT conditions. Participants were requested to complete one module per week across 7 weeks, with each module taking between 60 and 90 min to complete. The average completion time for SIT was 8.18 weeks ($SD = 4.67$; range: 1.86–25.43) and 7.94 weeks ($SD = 4.20$, range: 1.43–24.29) for ACC. Staggered incentive payments (up to \$150) were awarded based on the completion of intervention modules and study measures across the entire RCT. Prizes (valued at \$300) were also periodically raffled as participants accumulated raffle tickets based on completion rates.

Social Intelligence Training

Participants assigned to SIT received an online curriculum containing seven thematic learning modules. Content videos, YouTube videos, whiteboard animations, and interactive quizzes were common across all modules, totaling 42 sessions. Complete details about SIT are shown in Table 2 and can also be found at <https://www.socialintelligenceinstitute.org/>.

After each SIT module, participants were prompted to write responses to questions designed to provoke thoughtful attention to current and past personal experiences relevant to the material presented. Instructions were also given that moved participants from awareness to practice exercises for enhancing readiness to change and self-efficacy. SIT modules built upon one another, gradually increasing the depth of awareness and cognitive-behavioral engagement with the material to instill the habit of socially intelligent reasoning and thoughtful action. Reward badges were given after completion of each module, to promote engagement, along with a final Certificate of Completion.

Attention control condition

The ACC encompassed 42 online informational sessions that were embedded into one of the following seven modules under the umbrella of “healthy living”: Heart Health and Exercise; Sleep; Aging; Oral Health; Nutrition; Relaxation; and Cold and Flu. The ACC followed the same structure and process as SIT. Specifically, sessions contained a 5- to 15-min video lesson, followed by reflection questions encouraging participants to evaluate their health choices. After each module, participants received digital badges of achievement.

Although the choice of optimal control or comparative conditions for RCTs is a highly debated topic, an NIH expert panel concluded that such choice depends on the specific aims and circumstances of a given study (Freedland et al., 2019). The aim of the present study was to examine the initial efficacy of a highly novel intervention under the unique circumstances whereby no evidence-based standard of care was known to exist, participants were not recruited based on any clinical criteria or across any specific practice settings (Ferreira et al., 2021; Freedland et al., 2019). Thus, instead of a usual care control condition, we adopted the ACC to optimize internal validity by controlling for the non-specific factors of receiving attention from study personnel, participating in an online program, and an expectancy for treatment-related change to occur that may yield positive outcomes in the absence of a specified treatment (Kazdin, 2021).

Measures

All data were collected online via Qualtrics. Baseline data were collected before each custodial grandmother began her assigned condition (T1), and postintervention surveys occurred within 1 month after completing the intervention (T2), and successive follow-up surveys occurred at 3 months (T3), 6 months (T4), and 9 months (T5) postintervention. All RCT components were completed between June 26, 2018, and April 1, 2022. All reported Cronbach alpha (α) values reported below were derived from T1 data. The RCT ended as per the study timeline.

Depressive symptoms

Indicators consisted of the 10-item Center for Epidemiological Studies—Depression Scale, which assesses depressive symptoms over the past week (Andresen et al., 1994). The CES-D, which is widely used in research on custodial grandmothers, includes three items on depressed affect, five items on somatic symptoms, and two (reversed) items on positive affect. Response alternatives range from “rarely or none of the time” (0) to “all of the time” (3). Higher scores reflected more depressive symptomology and $\alpha = 0.81$.

Anxiety symptoms

Indicators were the three items of the Anxiety 11 subscale of the Medical Outcomes Study Mental Health Inventory (Stewart et al., 1992). Items (e.g., “Have you felt tense and high strung”) were rated from 1 (*none of the time*) to 6 (*all of the time*). A higher score reflected greater frequency of anxiety symptoms, with $\alpha = 0.84$.

Loneliness

Indicators were from the three-item Loneliness Scale (Hughes et al., 2004). Items (e.g., “Did you feel that you lack companionship”) were rated from 1 (*hardly ever*) to 3 (*often*). Higher scores reflected more frequent loneliness, and $\alpha = 0.86$.

Self-esteem

Indicators were from the 10-item Rosenberg Self-Esteem Scale (Rosenberg, 1965). Items (e.g., “On the whole, I am satisfied with myself”) were rated from 1 (*strongly disagree*) to 4 (*strongly agree*). Higher scores indicated better self-esteem, with $\alpha = 0.88$.

Table 2. Content Covered in Social Intelligence Training Modules

Module #	Content
1.	-Brain development and the life-long capacity to form new neuro-connections that support one's future social relations.
2.	<ul style="list-style-type: none"> -The contagious nature of emotions. -Conscious and unconscious processing. -How the brain processes information guided by individual schemas and heuristics as well as overarching cognitive biases. -How being aware of the benefits and consequences of these ways of thinking improves the capacity to understand oneself and others.
3.	<ul style="list-style-type: none"> -The ability to identify feelings and thoughts of another person in order to respond appropriately and predict how others may react to one's actions. -Perspective taking as a skill that improves with deliberate attention to the feelings and actions of others.
4.	<ul style="list-style-type: none"> -In-group and out-group biases; how one's thoughts and behavior toward others are shaped by in-group favoritism, which often occurs outside of conscious awareness. -Raise awareness of the nature of prejudice and thoughtful ways of responding to out-group members.
5.	<ul style="list-style-type: none"> -Face-to-face and online communications, including the ebb and flow of positive face-to-faces social interactions as well as factors that disturb that natural cadence. -The importance of connecting with others was addressed by contrasting the plentiful but relatively shallow online connections and the potential richness of connecting face to face. -Pathways to improving communication with one another, through awareness and practice.
6.	<ul style="list-style-type: none"> -How past experiences, particularly interactions with parents and other family members early in life, shape schemas formed about the trustworthiness of social relationships, and the willingness to engage meaningfully with others. -Resistance to learning new ways of relating to others.
7.	<ul style="list-style-type: none"> -Emphasized choice by noting how each person is not destined to repeat old patterns of relating. -People have the capacity to form new social connections, modify their schemas, and enhance the quality of long-standing relations in need of repair, if they choose to do so. -Well-established ways of relating can be changed through both awareness and self-regulation efforts.

Prosocial behavior

Indicators were 10 items from a modification of the Values in Action Inventory of Strengths (Padilla-Walker et al., 2015), which measures prosocial behaviors towards others (e.g., “I try to cheer up people who seem sad,” “I try to help people I don’t know, even if it’s not easy for me”). Items were rated on a 5-point Likert scale from 1 (*not like me at all*) to 5 (*very much like me*). Higher scores indicated greater prosocial behavior, with $\alpha = 0.87$.

Relationship quality

This was assessed separately with respect to the target grandchild and to a close friend. In both instances, grandmothers rated how frequently over the past 2 months each of three items (e.g., “Made you feel loved and cared for”) occurred from 1 (*not at all*) to 5 (*a great deal*). Items were derived from the work of Fingerman et al. (2008). Higher scores reflected better relationship quality, and $\alpha = 0.78$.

Attachment insecurity to grandchild

Items from the Experience with Close Relationships—Relationship Structures Questionnaire (Fraleigh et al., 2011) were indicators of the grandmother’s attachment security to the target grandchild.

Three items ($\alpha = 0.85$) indicated attachment anxiety (e.g., “I often worry that my grandchild doesn’t really care for me”), whereas six items ($\alpha = 0.72$) indicated attachment avoidance (e.g., “I don’t feel comfortable opening up to my grandchild”). Items were rated from 1 (*strongly disagree*) to 7 (*strongly agree*). Higher scores indicated greater attachment insecurity ($\alpha = 0.72$).

Analytic Plan

First-order latent difference score models were conducted for each latent outcome (see Table 3), using Mplus 8.1, across each time of measurement: T1 to T2, T1 to T3, T1 to T4, and T1 to T5. Each latent outcome was indicated by the indicators described above. SIT and ACC were compared by regressing RCT condition (coded 0 for ACC and 1 for SIT) onto the slope (i.e., estimate of change) of each latent construct in all

models. Analyses were conducted on an intent-to-treat basis (ITT), as specified by CONSORT guidelines (Schulz et al., 2010). Missing data were accommodated with robust full-information maximum likelihood (FIML).

Within each first-order latent growth model, the model-implied intercepts (baseline levels) and slopes (estimate of change) were determined by RCT condition for each outcome. From these values, the model-implied latent means for the different time points were computed in the metric of their first-order factors’ indicator variables. Standardized effect sizes (ES) for differences in latent change means by groups were computed, as per Hancock (2001).

Through employing and adapting SEM power analysis methods detailed elsewhere (Hancock, 2001; Hancock & French, 2013), and by using data from prior investigations as much as possible, sample size determination was focused to ensure adequate statistical power ($\pi = 0.80$ for $\alpha = 0.05$ -level tests) for all key parameter tests described above. To be able to detect standardized paths of at least 0.18 in a given model, differences in (standardized) paths across groups of at least 0.18 (e.g., 0.22 vs 0.40), and small ES for mean differences between SIT and ACC, while planning for a very conservative 20% longitudinal attrition (Davey, 2009), the resulting target sample size was in the $n = 160$ – 170 range for each RCT condition.

Results

Percentages of course completion by RCT condition were 0% (SIT = 18.4%; ACC = 11.6); 1%–99% (SIT = 37.3%; ACC = 24.4%); 100% (SIT = 44.3%; ACC = 64.0%). Despite better completion within the ACC, SPSS cross-tabulation revealed only a weak association between RCT condition and percent completion ($\eta^2 = 0.21$).

The CONSORT flow chart (see Figure 1) shows that data were obtained from 349 (100%) grandmothers in T1, 241 (69.1%) in T2, 221 (63.3%) in T3, 230 in T4 (65.9%), and 228 (65.3%) in T5. Despite these follow-up losses, all 349 grandmothers were included in the analyses, as allowable by FIML estimation, which has been shown to produce unbiased

Table 3. Effects of Randomized Control Trial Condition for Changes in Latent Constructs Across Times of Measurement.

Construct	Change since baseline (T1)															
	T2 Immediate postintervention				T3 3-Month past intervention				T4 6-Month past intervention				T5 9-Month past intervention			
	Est.	SE	<i>p</i>	ES	Est.	SE	<i>p</i>	ES	Est.	SE	<i>p</i>	ES	Est.	SE	<i>p</i>	ES
Psychological																
Depressive symptoms	0.08	0.06	.06	0.22	0.02	0.06	.36	0.06	0.09	0.05	.05	0.24	-0.03	0.07	.31	0.07
Anxious symptoms	0.09	0.13	.23	0.11	0.07	0.11	.27	0.09	0.07	0.12	.29	0.09	0.24	0.13	.02	0.28
Self-esteem	0.14	0.05	.001	0.41	0.06	0.06	.14	0.16	0.09	0.06	.04	0.25	0.01	0.06	.41	0.03
Loneliness	-0.11	0.02	.08	-0.22	-0.06	0.02	.21	-0.12	-0.08	0.07	.15	-0.16	-0.06	0.08	.20	-0.12
Relational																
Prosocial behavior	0.10	0.06	.06	0.23	0.20	0.07	.003	0.40	0.14	0.08	.03	0.24	0.17	0.08	.01	0.29
Support from friends	0.21	0.13	.05	0.22	0.32	0.13	.004	0.36	0.21	0.12	.04	0.25	0.13	0.13	.15	0.14
Support from GC	0.20	0.10	.02	0.34	0.14	0.11	.09	0.21	0.03	0.10	.38	0.04	-0.04	0.11	.37	0.05
GC avoidant attachment	-0.37	0.18	.01	-0.36	-0.30	0.19	.05	-0.27	-0.14	0.18	.21	-0.13	-0.10	0.19	.30	0.09
GC anxious attachment	-0.36	0.16	.01	-0.32	-0.17	0.14	.12	-0.23	-0.20	0.17	.12	-0.18	-0.12	0.19	.27	-0.09

Notes: *p* Values are for one-tailed tests. Est = unstandardized parameter estimate; GC = grandchildren; SE = standard error of Est.

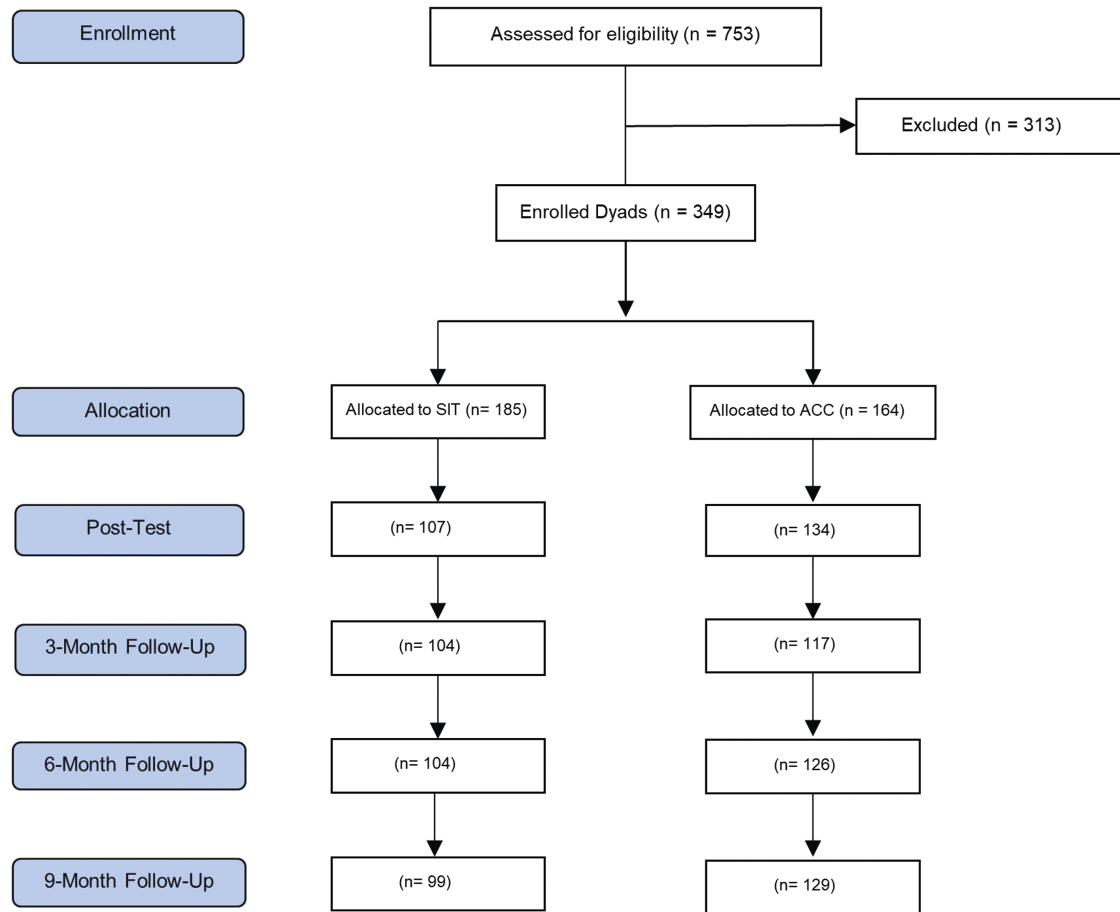


Figure 1. CONSORT RCT flow chart. ACC = attention control condition; RCT = randomized clinical trial; SIT = Social Intelligence Training.

parameter estimates and standard errors by estimating a likelihood function for each individual based on the variables that are present so that all available data are used and power is maintained (e.g., Enders & Bandalos, 2001). In order to do so, FIML requires that the missingness mechanism be missing completely at random (MCAR) or missing at random. A test of MCAR was conducted within SPSS, revealing missingness on all outcome variables across all time points to be consistent with data being MCAR, except for depression at T3 ($n = 3, 4.97\%$) and T4 ($n = 22, 2.64\%$). The most common reasons for such missingness were grandmothers becoming unreachable or requesting no further contact.

For each model tested, the fit was good, with indices falling within acceptable ranges (Hu & Bentler, 1999): comparative fit index (near 0.95), root-mean-square error of approximation (≤ 0.06), and standardized root-mean-square residual (≤ 0.08). Table 3 shows, for each RCT comparison across each time of measurement, the respective unstandardized path estimates and corresponding standard error for the slope factor regressed on RCT condition code predictor (i.e., group difference in latent change score), as

well as the corresponding standardized ES (d) and p values. Regarding psychological outcomes, there were no significant differences between RCT conditions for loneliness across any times of measurement, although there was a trend in the hypothesized direction with SIT resulting in greater decreased loneliness versus ACC. Positive change in self-esteem was significantly greater at both T2 ($d = 0.41$) and T4 ($d = 0.25$) for SIT versus ACC. Both depressive and anxious symptoms changed in the opposite direction than hypothesized, with SIT showing significantly more depressive and anxious symptoms at T4 ($d = 0.24$) and T5 ($d = 0.28$) versus ACC.

Changes in relational outcomes across all measurement times were as hypothesized. For prosocial behavior, change was significantly more positive change for SIT at T3 ($d = 0.40$), T4 ($d = 0.24$), and T5 ($d = 0.20$) versus ACC. For support from friends, compared to ACC, change was significantly more positive for SIT at T2 ($d = 0.22$), T3 ($d = 0.36$), and T4 ($d = 0.24$). For support from the target grandchild, change was significantly more positive ($d = 0.34$) for SIT at T2 only versus ACC. For avoidant-attachment with the target

grandchild, there was significantly greater reduction for SIT at T2 ($d = -0.36$) and T3 ($d = -0.27$) versus ACC. For anxious attachment, there was significantly greater reduction for SIT at T2 only ($d = -0.32$).

Table 4 shows estimated latent means for each latent outcome at T1, T2, T3, T4, and T5 by RCT condition. Inspection of this table, while bearing in mind the above statistically significant differences by RCT condition, reveals different patterns of change by condition across time. For instance, whereas SIT latent means for self-esteem rose slightly from baseline at both T2 and T4, there were corresponding large decreases within ACC across these same times. Latent means for both prosocial behavior and support from friends show a slight decrease over time within SIT, compared to a larger decrease within ACC. Although support from the target grandchild remained the same from T1 to T2 within SIT, there was a corresponding decline in this latent construct within ACC. Avoidant and anxious attachment were the only constructs that change over time by condition in the hypothesized direction. For both, there was improvement observed for SIT with corresponding adverse changes within ACC.

Although Table 3 reveals no significant difference by RCT condition for loneliness, Table 4 shows a tendency for latent means on this outcome to increase over time within both SIT and ACC. In contrast, latent means for anxious symptoms increased over time within SIT while decreasing slightly over time within ACC. As noted in Table 4, although the latent means for depressive symptoms increased minimally for SIT from T1 to T4, they decreased more across this duration for ACC. By T5, latent means on loneliness improved from T1 within both conditions.

Discussion

To our knowledge, we conducted the first RCT examining the efficacy of SIT on key indices of custodial grandmothers' psychological and relational well-being at immediate post-test intervention (T2), as well at 3 (T3), 6 (T4), and 9 months (T5) postintervention. Although we hypothesized that all outcomes across all times of measurement would favor statistically significant improvements resulting from SIT versus

ACC, our findings were not so clear cut. Notable anomalies were that significant differences observed between the two RCT conditions varied depending on the specific times of measurement as well as outcome type. For some outcomes, it appears that SIT may have attenuated deterioration over time as opposed to resulting in a substantial improvement from baseline levels. We believe that these unexpected findings may be partly attributable to the mental health sequelae of COVID-19 pandemic, which emerged as a major public health emergency in January 2020 (Eurosurveillance Editorial Team, 2020). Although we did not anticipate the pandemic arising during this RCT, its likely impact on the findings is supported by the fact that nearly 40% of the enrolled custodial grandmothers did not begin their intervention phase until January 2020 (or afterward) and nearly 60% completed their immediate postintervention survey after January 2020.

Findings by Outcome Type and Time of Measurement

Psychological outcomes

Regarding outcome type, SIT yielded considerably more favorable outcomes across time within the relational versus psychological realm. Indeed, self-esteem was the sole psychological outcome for which SIT (vs ACC) produced more favorable change at specific times of measurement (i.e., T1 to T2 [$d = 0.41$] and T1 to T4 [$d = 0.25$]). The latent means, however, revealed a pattern whereby self-esteem increased modestly at both times of measurement for SIT while declining at both times for ACC. It is also intriguing that, for both conditions, latent mean self-esteem scores at T1 were identical to those at T5. This may be because a substantial number of participants began the study (T1) near the COVID-19 pandemic onset, whereas many others completed the study (T5) after the height of pandemic-related concerns swept the country. Similarly, although there were no statistically significant differences between RCT conditions regarding loneliness across any times of measurement, latent means for this outcome showed a pattern of increases for both conditions across T2 to T4, with a return to baseline level at T5 for SIT only.

Surprisingly, significant differences in change for depression and anxiety symptoms occurred only at longer-term

Table 4. Estimated Latent Means for Latent Outcomes by Randomized Control Trial Condition at Baseline (T1), Immediate Postintervention (T2), 3-Month Past Intervention (T3), 6-Month Past Intervention (T4), and 9-Month Past Intervention (T5)

Outcome	Social Intelligence Training					Attention control				
	T1	T2	T3	T4	T5	T1	T2	T3	T4	T5
Emotional										
Depression symptoms	2.39	2.41	2.37	2.40	2.33	2.41	2.35	2.37	2.33	2.39
Anxiety symptoms	2.20	2.30	2.27	2.27	2.40	2.40	2.40	2.39	2.41	2.34
Self-esteem	3.14	3.18	3.10	3.16	3.14	3.20	3.11	3.11	3.14	3.20
Loneliness	1.64	1.74	1.67	1.69	1.64	1.57	1.77	1.66	1.71	1.65
Relational										
Prosocial behavior	4.27	4.28	4.20	4.20	4.16	4.42	4.33	4.15	4.22	4.15
Support from friend	3.89	3.78	3.82	3.74	3.82	4.04	3.71	3.65	3.69	3.84
Support from GC	4.06	4.06	4.05	4.16	3.98	4.01	3.82	3.86	4.08	3.97
Avoidant attachment	3.91	3.73	3.80	3.89	3.90	4.05	4.24	4.24	4.17	4.14
Anxious attachment	2.01	1.89	2.00	2.10	2.09	2.04	2.27	2.20	2.31	2.24

Note: GC = grandchildren.

follow-ups (T4 and T5) and were more favorable within ACC. Although latent mean scores for anxiety symptoms rose across all times of measurement within SIT, they were stable across T2 to T4 with a significant ($d = 0.28$) drop at T5 versus a continuing rise in symptoms for SIT. Similarly, latent mean scores for depressive symptoms were stable across time for SIT (with a noticeable drop at T5) while continuing declines occurred for ACC. Difference in latent change between SIT and ACC was significant ($d = 0.24$) at T4 only.

In retrospect, there are three potential reasons why the observed efficacy of SIT regarding change in psychological outcomes was not just meager but also in the opposite of what was hypothesized for depression and anxiety symptoms. First, as described earlier, SIT content was focused exclusively on matters pertaining to enhancing interpersonal relationships, without specific emphasis on reducing psychological distress. Instead, consistent with evidence that SI is an integral component of mental health, because it facilitates the enlistment of positive social ties that lower stress, raise self-esteem, and act as sources of social support (Repetti et al., 2002), we expected changes in psychological outcomes to follow from initial positive changes within relational outcomes produced by SIT (Howick et al., 2019).

Second, any positive psychological changes resulting from SIT may have been precluded by lockdown measures and other stressors brought on by the COVID-19 pandemic, which exerted adverse effects among middle-aged and older adults on many of the same psychosocial outcomes examined here such as depressive and anxious symptoms, loneliness, and engagement within close relationships (Arora et al., 2022; Bevan et al., 2023; Mooldijk et al., 2022). Moreover, because adverse psychosocial impacts of the pandemic were more pronounced within vulnerable families, they may have been similarly pronounced among at-risk custodial grandfamilies (Hayslip et al., 2017). Along these lines, Weekland et al. (2021) noted that “families with low socioeconomic status and preexisting problems in family relations or mental health seem to be affected by the pandemic and are in need of support, both in dealing with the pandemic as a disaster and with collateral effects of the preventive measures” (p. 1560).

Finally, our findings are compatible with the observation that changes in psychological well-being are not always incremental and linear as is traditionally assumed (Hayes et al., 2007). Consistent with this view, content received by custodial grandmothers in the SIT condition may have first challenged and destabilized old patterns of thinking and responding that lead to emotional arousal instead of decline in symptoms. For example, self-reflection and emotional processing exercises throughout the SIT encourage awareness of stressful aspects of oneself and social relationships, akin to interpersonal therapy (Lipsitz & Markowitz, 2013).

Relational outcomes

Although findings regarding relational outcomes were more favorable than those within the psychological realm, there nevertheless appeared to be a pattern of SIT buffering adverse changes over time, like that regarding psychological outcomes. For instance, although significant differences in change from T1 between SIT and ACC regarding prosocial behavior emerged at T3, T4, and T5, the latent means revealed a pattern of less decline in SIT (vs ACC) participants over time, except for a slight increase at immediate postintervention (T2) that fell just shy of significance. A similar pattern

emerged for support from friends, where significant differences between SIT and ACC in change from baseline occurred at T2, T3, and T4. Once again, latent means reveal that there was significantly less decline from baseline in SIT condition.

Significant positive outcomes regarding custodial grandmothers' relationship with target grandchildren were more limited to the short term (i.e., T2 and T3). For example, SIT and ACC significantly differed regarding change in support from the grandchild at T2, with latent mean scores remaining the same at T1 and T2 for SIT while declining for ACC. At both T2 and T3, there were significant differences in change from T1 in avoidance attachment with target grandchildren within SIT showing mean level declines while those in ACC showed corresponding increases. Similarly, at T2 only, mean scores on anxious attachment with target grandchildren dropped from baseline for SIT, while increasing for ACC.

Our findings regarding an apparent protective or buffering impact of SIT on relational outcomes are understandable in terms of how the COVID-19 pandemic affected interpersonal relationships. For example, a meta-analysis of international research suggests that such preventive measures as shelter-in-place, physical distancing, travel bans, remote work, and education led to robust increases in loneliness across gender and age groups over time (Ernst et al., 2022). That SIT did not yield positive changes on this outcome may suggest that, especially during a pandemic, efforts to prevent or reduce loneliness may require fostering opportunities for social contact (e.g., online social participation) in addition to improving social skills and addressing maladaptive social cognitions (Ernst et al., 2022; Masi et al., 2011).

Our observation of less decline in both prosocial behavior and support from friends in SIT versus ACC over time may be understood by findings from a multicountry study that examined predictors of prosocial behavior during the pandemic (Haller et al., 2021). Across 60 countries, it was found that prosocial behavior was most strongly associated with the perception of having social support, and that spending time with friends who felt lonely and being available for volunteering occurred the least frequently across all regions. These findings were attributed to pandemic-related restrictions that negatively altered social life, as well as the perceived health dangers of having direct social contact with others (Haller et al., 2021). Of relevance to custodial grandmothers, their extra responsibilities related to childcare (e.g., home schooling) and financial insecurity may have further diminished prosocial behavior during the pandemic (Haller et al., 2021; Holmes et al., 2020). That SIT might have attenuated decline in prosocial behavior during the pandemic is salient given that prosocial behavior has been suggested as a key therapeutic target during the pandemic, including with respect to disease containment (Haller et al., 2021; Holmes et al., 2020).

It is noteworthy that relational outcomes pertaining to target grandchildren were the only ones where SIT yielded significant increases from baseline compared to ACC as hypothesized. There are two likely reasons why this may have occurred. First, due to social distancing regulations, support from outside sources may not have been accessible, and a close co-residing family member like a custodial grandchild may have become the central source of support to grandmothers. Second, as per socioemotional selectivity theory (Carstensen et al., 2020), custodial grandmothers are more likely to devote attention and effort to close relationships (such as that with their grandchild), as opposed to less significant relationships

with other family members or friends. Thus, diminished attachment insecurity and increased support from target grandchildren reported by custodial grandmothers from baseline in SIT versus ACC may have been motivated by a combination of their pragmatic need for social support within the immediate household, as well as the normal age-related tendency to focus selectively on close meaningful relationships. It is not surprising that both perceived support from and attachment security (i.e., low avoidant and low anxious) with target custodial grandchildren showed a similar pattern of positive effects from SIT given that individuals with insecure attachment styles perceive their social network as less supportive than those with secure attachment styles (Costa-Cordella et al., 2022).

Qualitative follow-up interviews conducted with 27 grandmothers who participated in SIT corroborate the likely impact of COVID-19 on the present study and its findings (masked for review). A common theme involved feelings of distress brought on by lockdowns, fear of COVID-19 exposure, isolation from family and friends, and challenges related to target grandchildren's remote schooling. At the same time, grandmothers said that the pandemic reminded them of the importance of their relationships with their grandchildren and gave them more time to practice using SIT skills, particularly slowing down and attending to the target grandchild, spending more time doing activities together, and engaging in more face-to-face communication.

Limitations and Directions for Future Research

Although we view the findings of this RCT as having been affected by unanticipated emergence of the COVID-19 pandemic, there is no way to verify this. In turn, there appears to be no scientific literature whatsoever regarding the pandemic's potential impact on psychosocial intervention research. Nevertheless, future studies on the efficacy of SIT with custodial grandfamilies under normal environmental conditions are warranted, given our findings regarding its apparent efficacy related to several psychological and relational outcomes. Moreover, the above-noted positive findings regarding the efficacy of SIT found during nonpandemic circumstances with middle-aged adults further indicate its future promise (Castro et al., 2019, 2023).

Another limitation concerns the number of custodial grandmothers who did not complete the entire RCT condition as assigned, with completion being somewhat lower within SIT. We chose to not additionally perform Complier Average Causal Effect analysis because its value as a supplement to ITT is limited to low levels (<25%) of nonadherence (Mostazir et al., 2021). Although the extent of missing data over multiple times of measurement is concerning, all outcomes (except for depressive symptoms) were MCAR and our use of FIML estimation allowed us to compensate considerably for missingness in the overall matrix of data.

It should be acknowledged that the ES observed for change in study outcomes were primarily modest (d range = 0.22–0.36), except for self-esteem at immediate postintervention (d = 0.41) and prosocial behavior at 3-month postintervention (d = 0.40). Nevertheless, given the broad eligibility criteria of our study, it is noteworthy that these ES represent average treatment effects, which do not necessarily apply equally to all custodial grandmothers or to any subpopulations within this sample (Kraemer et al., 2006). In future analyses, we intend to explore if key sociodemographic characteristics (e.g.,

grandmother history of ACEs, race/ethnicity, age, SES) act as moderators of differential treatment efficacy between SIT and ACC (Kraemer, 2016). Such analyses are important given that the time, willingness, and outcomes related to participating in studies of this nature may vary considerably across key subpopulations of custodial grandmothers (Chan et al., 2023). Nevertheless, despite a nationally recruited sample, the generalizability of these initial efficacy findings is limited by the smaller number of racial and ethnic minority custodial grandmothers in the final sample relative to White custodial grandmothers, along with a complete absence of custodial grandfathers. Ideally, larger effectiveness trials should also be conducted to more rigorously examine how useful SIT is in real-world practice across diverse subpopulations of custodial grandparents who vary by key sociodemographic characteristics such as race, ethnicity, gender, age, and SES.

Conclusion

Within the context of a rigorous RCT, we examined the efficacy of an online SIT in comparison to a similarly delivered ACC at improving both psychological and relational outcomes for custodial grandmothers. Although SIT was superior in this regard, it largely exerted more preventive than bolstering effects, which may be partially attributable to the unanticipated emergence of the COVID-19 pandemic during the study. Nevertheless, our findings point to the potential usefulness of SIT with custodial grandfamilies, who comprise a vulnerable, underserved, and geographically dispersed population with histories of multiple intra- and interpersonal challenges (Hayslip et al., 2017; Shorey & Ng, 2022). Its uniqueness as an easily and inexpensively self-delivered online intervention makes SIT imminently scalable and accessible to grandfamilies within areas that lack the existing infrastructure to provide in-person services.

The societal importance of the present study and its findings is underscored not only by the current dearth of evidence-based interventions available for use with custodial grandfamilies (see Dolbin-MacNab, 2020), but also by several Congressional Acts aimed at supporting family caregivers. Whereas the Recognize, Assist, Include, Support, and Engage Family Caregivers Act of 2017 broadly addressed the diverse and complex issues faced by family caregivers of all types through the development of a National Family Caregiving Strategy (Administration for Community Living, n.d.), the 2018 Family First Prevention Services Act (GovTrack.US, 2021) has reformed the child welfare system by encouraging placement with relatives and providing expanded support to children, families, and kinship carers and the Supporting Grandparents Raising Grandchildren Act (GovTrack.US, 2019) formed an Advisory Council to identify, promote, coordinate, and disseminate information about resources and best practices for helping grandparents and other relatives raising children.

Supplementary Material

Supplementary data are available at *The Gerontologist* online.

Funding

This work was supported by the National Institute on Aging (R01AG054571).

Conflict of Interest

None.

Data Availability

The data pertaining to this paper will be available upon request. This study was registered with ClinicalTrials.gov under [NCT03239977].

Acknowledgments

We recognize the invaluable contributions to the work reported on in this manuscript made by the late Dr. Alex Zautra.

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