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CEOA Scale - Blurred Perception of Older Adults Resulting from Limited Intergenerational Contact

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Abstract

This study introduces the Children's Empathy for Older Adults (CEOA) eight-item scale, a novel image-based instrument designed to measure young children's views, empathy, and behavioural intentions toward older adults. CEOA was administered as a pre-test and post-test metric, following storytelling sessions, on 232 children aged 5-6 years in the multi-racial and multi-cultural context, Singapore. Findings revealed that children with regular exposure to grandparents demonstrated clearer, more distinct responses across all three domains, indicating a more developed understanding of older adults' needs. In contrast, children without such exposure showed less differentiation between cognitive, affective, and behavioral components. These results underscore the importance of intergenerational contact in shaping children's perceptions and empathy for older adults. The paper contributes a new methodological tool, a multidimensional framework of empathy, and evidence on the importance of grandparental contact. It bridges gaps in cross-cultural gerontology, and offers practical pathways for interventions to foster positive intergenerational relationships.

Keywords: older adults; ageism; scale; empathy

Contribution to the Field

This study advances the intergenerational field in the following ways.

Introduces the Children's Empathy for Older Adults (CEOA) scale, a novel image-based tool that captures young children's cognitive, affective, and behavioral responses toward older adults.

Provides empirical evidence that regular grandparental contact strengthens children's empathy and understanding of aging, highlighting the familial dimension of intergenerational ties.

Demonstrates the utility of CEOA as both a general assessment and an intervention evaluation tool, bridging theory and practice in intergenerational program design.

Offers methodological innovation for multilingual, multicultural contexts, informing policy and interventions to reduce ageism from early childhood.

Introduction

Population aging has heightened the importance of fostering positive intergenerational relationships from an early age. While various instruments measure adults' attitudes toward older people, few tools specifically assess young children's views, especially in multilingual contexts, complicated by differences across cultures and across generations (North and Fiske, 2015). This study addresses this gap by introducing CEOA, an image-based assessment tool, and evaluating its effectiveness in measuring changes following a storytelling intervention.

The "Children's Empathy for Older Adults" (CEOA) scale was designed as a tool to measure children's views (Cognitive, "C" domain), level of empathy for older adults (Affective, "A" domain) and inclination to help older adults (Behavioural, "B" domain). CEOA consists of eight questions which uses the five-point Likert scale to measure three domains – cognitive (two items), affective

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(three items) and behavioural (three items). The original design of the CEOA that was used for this exploratory study con-sisted of 12 items, but eight items were eventually selected, following exploratory fac-tor analysis.

The tool was administered to 232 children between 5- to 6-year-old, over six story-telling sessions in Singapore. The story "Pedro and His Grandparents" is an animal fable about a young manatee which received the sacrificial love of his grandparents and as he matures, he learns to care and offer help to them.

Literature Review

Based on literature review, most tools were designed to measure adult's views of older people and their attitudes towards them (Ayalon et al. 2019). Conversely, CEOA is a tool meant for children. It does not only measure children's views of older adults but also measure the level of empathy and inclination to offer help to older adults.

One of the common methods which existing tests use, is to understand children's perception of older adults by requiring participants to write words that come to their mind when they think of older adults (e.g. Flamion et al. 2020). Some of the words e.g. wheelchair, grey hair, spectacles, are taken to connote ageism as they are considered as "negative stereotypes" of older people.

However, from a gerontological perspective, these words are objective descriptors of many older people whom children have contact with. These words may not represent negative stereotypes. In addition, some young children (especially children whose native language is not English) may lack the vocabulary to articulate their views of older adults.

Another common method which existing tests use, is to measure children's views of older adults by asking the children to select from bipolar adjectives when they think of an older person (Ayalon et al. 2019, Fernandes et. al, 2023 and Flamion, et. al, 2020). These tests are not suitable in contexts where English is not the native language of young children as they may have limited vocabulary to describe older adults.

Bipolar adjectives will also be subjected to different interpretations e.g. "healthy" could refer to "an active and physically fit older adult" to some children. In comparison, "healthy" could refer to an older person who isn't physically fit, but "free from chronic illnesses".

CEOA on the other hand, uses images to assess children's perceptions and attitudes towards older adults. The use of images in CEOA will circumvent the language issue. The use of images in the test will standardize the issue of differences in interpretation, as these images present simple and clear depiction of older adults in specific activities or situations. The images will also standardize the profile or the physical appearance of the older adults.

This is one of the few tools to measure all three domains - children's cognitive, affective and behavioural inclination towards older adults (Mendonca, et al., 2018). This is also one of the few tools that uses images as an instrument to measure children's views, empathy and inclination to help older adults.

Literature review had only surfaced one other scale to measure children's perception of older adults, with the use of images. Flamion et al. (2000) had developed the "Young Children's Views of Older People (YCVOP)" tool, based on a visual analogue YCVOP drew heavily from two classical test of children's perceptions of older adults - Children's Attitudes Toward the Elderly (CATE) scale (Jantz et al., 1976), the Children's Views of Aging (CVOA) scale (Marks et al., 1985) - and a cartoon method designed by Caspi (Caspi, 1984). It was found to be easy to use and had internal consistency (Flamion, 2020).

Different Perceptions of Older Adults

Davidovic et al. (2007) found that children who had regular contact with grandparents showed more positive attitudes towards older adults compared to those with limited contact. Frequent intergenerational contact was associated with reduced age-based prejudice and more positive

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perceptions of older adults, (Tam et al., 2006). Some studies reported that it is the quality of the relationships that matter more than the frequency of contacts. Emotional closeness and family climate, rather than just cohabitation, were important for positive perceptions (Stašová and Krisikova, 2014) and (Naumova and Glozman, 2021a/b).

Children with closer relationships with grandparents were associated with more positive views of aging among adolescents (Attar-Schwartz et al., 2009). However, Smith and Charlton (2020) and Luchesi et al. (2012) reported that cohabitation, especially with ill or cognitively impaired elders, could be associated with more negative attitudes.

Children's Empathy for Older Adults (CEOA)

CEOA can either be used as (a) a general scale to measure the cognitive, affective and behaviours responses of children towards older adults or (b) a pre-intervention and a post-intervention tool to measure any possible changes in the respondent's (children's) views (cognitive), empathy (affective) and inclination to help (behavioural) older adults.

The Three Domains of CEOA

CEOA can either be used as (a) a general scale to measure the cognitive, affective and behaviours responses of children towards older adults or (b) a pre-intervention and a post-intervention tool to measure any possible changes in the respondent's (chil-dren's) views (cognitive), empathy (affective) and inclination to help (behavioural) older adults.

In the CEOQ, images 1 and 2 are to measure cognitive responses/children's views of older adults, images 3 to 5 to measure affective responses/ children's level of empathy for older adults, and images 6 to 8 to measure behaviour responses/ children's inclination to help older adults. Table 1 below describes the three domains; the items used in each domain and the scale used to measure the items.

Table 1. The three domains of CEOA and the measurement scale.

The Three Domains of CEOA		
Cognitive Level ("C")	Affective Level ("A")	Behavioural Level ("B")
Entail thoughts, knowledge, and/or reasoning regarding older adults.	Empathy towards older adults.	Inclination to help older adults.
Item Names and description		
Cexercise – older adults exercising together Cfeed – a grandparent feeding a young child	Aworried – and older adult looking worried Afell – an older adult falling Alonely – an older adult looking at other older adults interacting with each other	Bheavy – an older adult carrying many bags Bdropped – an older adult trying to retrieve an item that had dropped under the table Bseat – an older adult standing in a bus
Children's Empathy for Older Adults (CEOA)		
Images 1 and 2	Images 3 to 5	Images 6 to 8
The images depict older adults exercising, socializing, feeding a young child and playing with a young child.	The images depict older adults that are weak, sick, falling down and looking lonely.	The images depict older adults who had dropped an item, carrying many bags of things, standing up in a public bus and walking up a

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Children will select one of the three emojis, which represents: - agree that it is good for older adults to socialize - disagree that older adults should not socialize - shocked to see that older adults can/do socialize	Children will select one of the three emojis, which represents: - Sad to see an older adult who falling - Very sad to see an older adult falling - Uncertain or do not feel sad to see an older adult falling	slope with a mobility aid and Children will select one of the three emojis, which represent: - Shun away and not help carry the bags for the older adult - Do not know how to react/Uncertain of whether he/she will help the older adult - Offer help to carry the bags for the older adult
		

Calculation of Scores

CEOA uses a five-point Likert scale for calculation. However, the presentation of the scale was simplified to only show three emojis on a line. The emojis served as markers for scores of "1", "3" and "5". Children are asked to indicate their response on the "red line" by marking a cross anywhere on the red line. A cross marked between emojis will be given a score of 2 or 4.

The scores can be calculated by summing up the scores for each domain and comparing the total scores in each domain. For usage in pre-intervention and post-intervention evaluation, children should complete page one (indicated as "(1) Please do this first") before any intervention and then complete page two (indicated as "(2)" after the intervention. Similarly, the scores can be summed up for each domain in (1) and (2) and then compared against each other. The total scores for (1) and (2) can also be compared against each other to assess any changes in scores after the intervention.

Results

Eight Items Were Selected Based on Factor Loading

The results of Table 2 indicate that both groups—children with regular exposure to their grandparents and those without—achieved acceptable levels of sampling adequacy, as reflected in their Kaiser-Meyer-Olkin (KMO) values of 0.711 and 0.653 respectively. These values suggest that factor analysis is appropriate, with the group exposed to grandparents showing stronger adequacy.

Bartlett's Test of Sphericity further supports the suitability of factor analysis, with statistically significant chi-square values of 125.18 for the exposed group and 68.851 for the non-exposed group. Taken together, these findings imply that the data structure is sufficiently robust for further multivariate analysis, and that children with regular grandparental exposure may exhibit more coherent patterns in the measured variables.

Table 2. KMO and Bartlett's Test.

Children with regular exposure to their grandparents		**Children with no regular exposure to their grandparents**	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.711	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.653

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Bartlett's Test of Sphericity	Approx. Chi-Square	125.18	Bartlett's Test of Sphericity	Approx. Chi-Square	68.851

Children with Exposure and Interactions with Older Adults Demonstrate Better Understanding of Older Adults

The Three Domains of the CEOA are Distinct and More Reliable when Used on Children who have Regular Exposure to their Grandparents than Children who do not have Regular Exposure to their Grandparents

Table 3. The Three Domains of the CEOA are Distinct and More Reliable when Used on Children who have Regular Exposure to their Grandparents than Children who do not have Regular Exposure to their Grandparents. The findings in Table 3 show that children with regular exposure to their grandparents demonstrate clearer and more reliable factor structures in the three domains of the CEOA.

The initial eigenvalues reveal that three factors exceeded the threshold of 1.0, ac-counting for a cumulative variance of 57.093%, which indicates a meaningful and interpretable structure. After extraction and rotation, the variance explained by these factors remained substantial, with the rotated sums of squared loadings highlighting distinct contributions across the three domains. This suggests that children who inter-act regularly with older adults not only exhibit better understanding of them but also provide data that supports a more stable and reliable measurement model. In contrast, the absence of such exposure tends to weaken the distinctiveness and reliability of the domains, underscoring the importance of intergenerational contact in shaping children's perceptions and comprehension of older adults.

Total Variance Explained (for Children with Regular Exposure to their Grandparents)

Factor	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.255	28.182	28.182	1.635	20.442	20.442	1.453
2	1.239	15.489	43.671	0.539	6.733	27.176	1.237
3	1.074	13.421	57.093	0.398	4.969	32.145	0.652
4	0.851	10.638	67.73				
5	0.736	9.201	76.931				
6	0.683	8.537	85.469				
7	0.605	7.561	93.03				
8	0.558	6.97	100				

Table 4 highlights the differences in factor loadings between children with regular exposure to their grandparents and those without. For children with regular exposure, items such as B_Heavy (0.705), B_Dropped (0.572), and B_Seat (0.553) load strongly on Factor 1, while items like A_Lonely (0.635) and A_Fell (0.502) align with Factor 2, and C_Exercise (0.603) with Factor 3. This distribution suggests a clearer and more distinct factor structure across the three domains.

In contrast, children without regular exposure show less consistent loadings, with items such as B_Heavy (1.037) and B_Seat (1.027) clustering heavily on Factor 1, while other items like A_Fell (0.597) and A_Worried (0.499) load moderately on Factor 2, and C_Exercise (0.432) on Factor 3. These results indicate that regular grandparental exposure enhances the reliability and distinctiveness of the factor domains, whereas the absence of such exposure leads to more diffuse and overlapping patterns.

Pattern Matrix

	Children with regular exposure to their grandparents	**Children without regular exposure to their grandparents**

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	Factor					
	1	2	3	1	2	3
PreBheavy	0.705			1.037		
PreBdropped	0.572			0.279		
PreBseat	0.553				1.027	
PreAlonely		0.635		0.233	0.275	
PreAfell		0.502				0.597
PreAworried		0.379				0.499
PreCexercise			0.603			0.432
PreCfeed			0.378			0.221

Table 5 illustrates the correlations among the three factors—"Cognitive", "Behavioral" and "Affective"—highlighting notable differences between children with regular exposure to their grandparents and those without. For children with regular exposure, the Behavioral factor shows a moderate correlation with the Affective factor (0.563) and a weaker correlation with the Cognitive factor (0.178), suggesting that their intentions to help are more closely linked to emotional understanding than to cognitive reasoning.

Similarly, the Affective factor correlates moderately with both Behavioral (0.563) and Cognitive (0.200), reinforcing the interconnectedness of emotional responses with action. In contrast, children without regular exposure exhibit weaker and less consistent correlations: Behavioral relates only modestly to Affective (0.248) and Cognitive (0.400), while Affective shows a moderate link to Cognitive (0.327). These patterns suggest that regular grandparental interaction strengthens the alignment between children's emotional responses and their willingness to act, while limited exposure results in more fragmented associations across the domains.

Table 5. Factor Correlation Matrix.

	Children with Regular Exposure to their Grandparents			*Children without Regular Exposure to their Grandparents*		
Factor	1	2	3	1	2	3
1 Behavioural/ Physical (Child's intention to take action, helping with physical tasks): Shun away/uncertain/offer help	1	0.563	0.178	1	0.248	0.4
2. Affective/ Emotional (Child's affect towards, understanding towards older person in need): No feeling/ Sad/ Very sad	0.563	1	0.2	0.248	1	0.327
3 Cognitive (Child's understanding/ thoughts of older persons' needs): Disagree/ Shocked/ Agree	0.178	0.2	1	0.4	0.327	1

The results show a clear, interpretable structure, which aligns well with existing components of empathy for children with regular exposure to their grandparents. The three factors show three distinct domains ("Cognitive", "Affective" and "Behavioral") that CEOA seeks to measure.

In contrast, the items do not cluster in three distinct domains for children without regular exposure to their grandparents. In particular, "Alonely" had low loading and "A_Fell" had double

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loading. The low factor loadings and lack of clear distinctions of the three domains could possibly be due to several reasons.

Firstly, the sample size for children with no regular exposure to older adults is a smaller group n=78, as compared to children without regular exposure to grandparents (n=154). Secondly, there could possibly be measurement non-invariance between the groups. Measurement non-invariance between the groups may reflect genuine differences across how the two groups of children conceptualise and think about aging-related concerns. Those without grandparent exposure may reflect more abstract understanding of the older persons, having fewer direct experiences to draw their responses from.

Significant Contributions to Understanding Intergenerational Relationships

This finding strengthens the argument that quality and frequency of grandparent–grandchild relationships shape children's mental models of aging. By situating the study in Singapore's multi-racial, multi-lingual context, the paper highlights how tools like CEOA can be applied in diverse societies.

CEOA is validated as both a general assessment tool and a pre/post intervention measure (e.g., after storytelling sessions). This dual use makes it valuable for designing and evaluating intergenerational education programmes, empathy-building interventions, and policies aimed at reducing ageism from early childhood.

Conclusions

The Children's Empathy for Older Adults (CEOA) scale represents a significant advancement in measuring young children's attitudes toward older adults, particularly in multilingual and multicultural contexts. CEOA's image-based approach effectively addresses the limitations of existing vocabulary-dependent instruments, making it particularly valuable in diverse linguistic settings. The three-domain structure of CEOA provides a comprehensive assessment of children's views, empathy, and behavioural intentions toward older adults.

Regular exposure to older adults may lead to more structured, experienced-based understanding about the age-related concerns. Children with grandparent exposure may have better understanding of the multidimensional nature of older persons' needs and hence develop richer mental models of ageing. Children without such exposure shows less clear alignment, presenting potential struggles to differentiate between abstract concepts from concrete lived experiences (e.g., trouble distinguishing between feelings and actions).

Children without regular exposure to older adults may struggle with the dilemma of helping older adults, particularly when there is an opportunity cost e.g. giving up the seat for the older adult standing in the bus. Using this knowledge, we could design interventions or education programmes to build empathy and better facilitate intergenerational contact.

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Conflicts of Interest: We have no conflict of interest to disclose.

All parts of this manuscript, including the images, questionnaires, and instruments employed, are original and unpublished.

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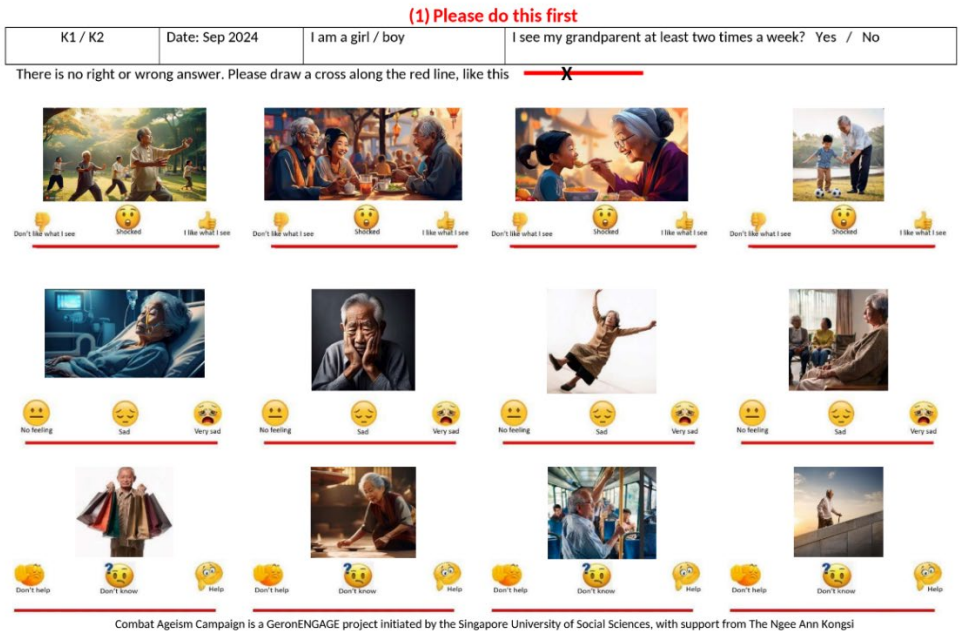
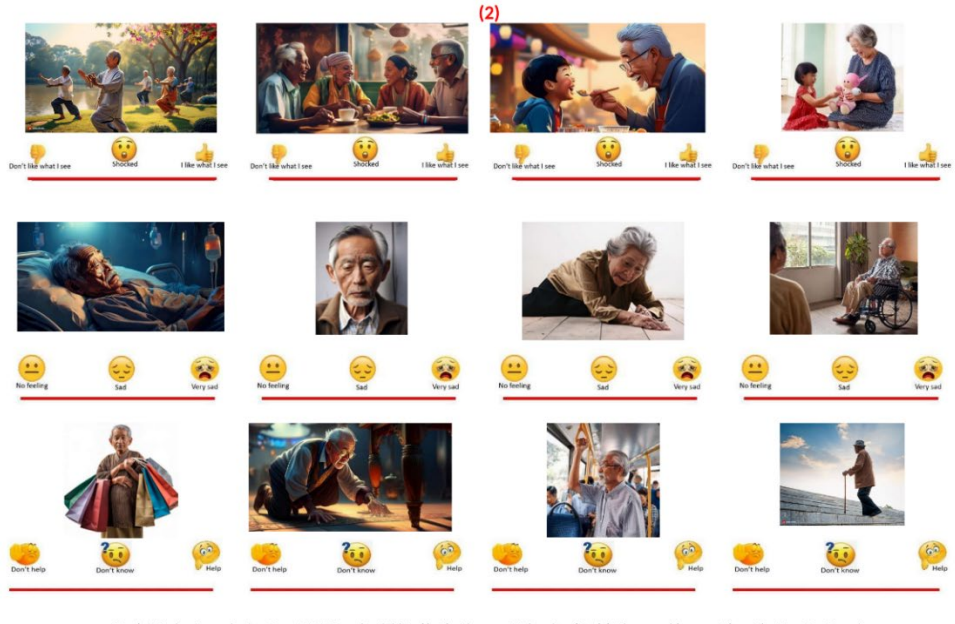
Annex A

CEOA





Images are all fictional. They were generated using Adobe Firefly.

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