

Recognition of a missing elderly couple in relation to attitudes about the elderly

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Previous research exists on AMBER alerts in helping to locate missing children, but there is a lack of research on public alerts for missing older adults. Silver Alerts (SA) are similar to AMBER alerts except that they are intended for elderly individuals who are considered to be in danger. In two studies, we presented university student participants with a mock SA and home video of a Caucasian couple in their 80's. We explored factors related to ability to recognise the two individuals, including individual difference variables and whether the couple appeared together or separately in the SA. In Study 1 ($N = 85$), we found that a measure of participants' attitudes towards the elderly (ATOA) was associated with recognition of the missing woman. Further, recognition was relatively low for a vehicle associated with the missing couple. In Study 2 ($N = 1,627$), we found that ATOA scores were associated with recognition of the missing man and woman. Presenting the missing couple separately did not result in a difference in recognition compared to presenting them together. In both studies, recognition levels were higher for the missing man than for the missing woman and higher for the missing persons than for a vehicle shown with them. Attitudes towards the elderly appears to be an important individual difference variable associated with ability to recognise missing elderly persons. Additional research is needed on Silver Alerts with a more diverse range of missing individuals and more diverse samples of participants.

Keywords: face identification; metacognition; missing persons; older adults; public alert systems

Face identification research includes studies on visual perception (e.g., Devue & Barsics, 2016); forensic psychology (e.g., Lee & Wilkinson, 2016; Royer et al., 2015); and neuroscience (e.g., Wang, et al., 2019). In the present study, we investigate face identification in the context of public alert systems intended to help locate individuals who have gone missing. In these situations, individuals may attempt to recognise a person they may have seen presented earlier in a missing person's alert.

Research on face identification helps locate missing individuals who may be at risk. AMBER alerts, for example, are used for children under the age 18 or for individuals who have physical or psychological disabilities. AMBER alerts were created to 'help find kidnapped children and impose tougher penalties on child abusers, kidnappers, and pornographers' (Associated Press, 2003). Silver Alerts are intended to help locate missing individuals over the age of 65 who may have a physical or psychological disability and who are thought to be in immediate danger. Alerts may occur on billboards, via cellphone alerts, or social media (Carr, 2010). Both programmes rely on the public's ability to identify the missing person if they should see the missing person in public.

Silver Alerts are particularly important due to a predicted exponential increase in the number of adults over the age of 65. According to the Population Reference Bureau, the 'number of Americans ages 65 and older is projected to nearly double from 52 million in 2018 to 95 million by 2060, and the 65-and-older age group's share of the total population will rise from 16% to 23%' (US Census Bureau, 2019, para. 3). One important consideration in preparing for this demographic shift is understanding our ability to identify faces of elderly individuals in case they are missing.

Research on face identification for older adults is crucial as this population is at higher risk of individuals going missing for various reasons. Older individuals may exhibit severe physical limitations such as poor vision, lack of coordination (e.g., while attempting to walk), and in some cases may be diagnosed with severe memory deficits, resulting the possibility of becoming confused and lost, possibly wandering away from their living facilities.

In addition to the increasing age population, another contributing factor for the number of increasing SA is the predicted number of older adults with dementia that has a side effect of wandering away from their place of residence. Alzheimer disease (AD) is the leading form of dementia contributing to older adults going missing (Rejojo, 2015). The Alzheimer's Association Report (2020) has noted an increase in dementia, including Alzheimer's disease (AD). Those suffering from dementia may show wandering behaviours (leaving their place of residence, usually with a purpose such as returning to their former home), or elopement. Elopement has been defined as 'the act of wandering away from a safe residence' (Aud, 2004, p. 362) and can put eloping persons at risk through getting lost or injured, primarily because of their impaired judgement and problem-solving ability. Wanderers are more likely to elope and/or wander away (Aud, 2004; Ballard et al., 1991). Elderly individuals may be missing for a variety of reasons in addition to dementia. For example, Logsdon (1998) found that patients with psychological disorders, such as those suffering from anxiety and depression, as well as those who sit alone a lot, tended to wander.

Research on face identification as it applies specifically to missing older adults is sparse. Only a few published articles have focused on this vulnerable population (Gier et al., 2016; Gier, 2019; Gier & Kreiner, 2019; Gier & Kreiner, 2020a; 2020b). Gier et al. (2016) conducted a study with the target individual (e.g., 'missing person') being a woman in her late 70s. She was shown in a video wandering in a park, dressed in either her nightgown or casual clothes. This study showed no difference in ability to recognise the missing person according to participant race, gender, or age. Three additional studies on Silver Alerts (Gier & Kreiner, 2019; 2020a; 2020b; Gier, 2019) investigated the effect of viewing an educational video on the importance of SAs prior to participants 'viewing a Mock SA and a short video of the missing person in her home. These studies examined associations of target recognition with several individual difference variables, such as Attitudes Towards Older Adults (ATOAs), empathy, conscientiousness, and contact with older adults. The researchers found an advantage in recognition after priming participants about the importance of Silver Alerts via an educational video. The researchers also found that females outperformed males in recognising the missing person, and Caucasians outperformed African American participants, consistent with Own-Race-Bias (ORB) (Gier & Kreiner, 2019).

Gier (2019) explored target recognition based on a mock SA in relation to individual differences. The procedure included the presentation of an educational video on the importance of Silver Alerts, and a video of the target male (65 years old) walking around his pool outside. The researcher experimentally manipulated whether participants viewed the educational video or not. Participants then viewed a Mock SA of the 'missing' target male followed by taking the Attitudes Towards Older Adults (ATOAs) scale, Basic Empathy Scale (BES), the IPIP

conscientiousness scale, as well as a short questionnaire on contact and experience with older adults, then the recognition phase. Participants who recognised the target scored higher in empathy, conscientiousness, and metacognitive ratings (e.g., confidence levels). However, unlike Gier and Kreiner (2019), the researchers found no significant benefit to recognition of viewing the educational video. Although the Gier (2019) and Gier and Kreiner (2020) studies were conducted in a laboratory setting, their results suggest SA can be effective under certain conditions.

Factors related to face identification

The literature on face identification accuracy reveals several common issues that may be relevant to the ability to recognise older adults. First, recognition accuracy may differ according to demographic characteristics of research participants in relation to the target individuals; these differences are often described as biases in face identification. Own-Age Bias (OAB) is the ability to recognise and respond more accurately to a person close to the participant's age (Anastasi, & Rhodes, 2005). Researchers have found an Own-Gender Bias (OGB), meaning that face identification is superior for one's own gender relative to the other gender (McKelvie, 1987). Although female participants have been consistently found to be better at recognising female faces than male faces (e.g., Cross et al., 1971; Lewin & Herlitz, 2002; Rehnman & Herlitz, 2006, 2007; Wright & Sladden, 2003), the results for male participants vary. For example, Herlitz and Lovén (2013) found that girls and women outperform boys and men if only male faces are presented and not paired with a female face. He et al. (2011) 'found that Younger and older adults' visual scan patterns were examined as they passively viewed younger and older neutral faces' (p. 97), and found support for the idea that participants' age cohort were more likely to look at those people of their own-age versus faces of people from other age groups. Macchi et al. (2015) found that teachers who had more experience with young children showed a reduced OAB. Their study also found that experience with people of different ages (e.g., young children) was related to increased recognition due to experience with that age group.

Own-Race Bias (ORB) was first studied by Feingold (1914), who found that people were more accurate when identifying faces of people from their own race than someone from another race group. Research on ORB over the past four decades has been demonstrated in multiple research paradigms and groups. Studies have found that even when exposure to the own group versus other group experience was brief, the ORB prevailed (Bernstein et al., 2007). Although ORB in relation to eyewitness testimony has been studied extensively, participant race as it pertains to Silver Alerts has only been investigated in two published studies (Gier et al., 2016; Gier, 2019). In both studies, participant race was not related to target recognition; however, in both studies the 'missing' older adult in a Silver Alert was Caucasian.

Another individual difference factor which may be important is attitudes towards older individuals. An overall negative attitude towards older adults could interfere with face identification. One way such attitudes can be measured is via the Attitudes Towards Older Adults (ATOAs) scale (Kogan, 1961). Several studies (Brown et al., 1999; Harwood et al., 2005) reported that positive experiences with older adults resulted in increased positive attitudes towards the older adults. These studies found that, prior to contact with older adults, the participants had more negative attitudes towards older adults, but after spending time with older adults, scores indicated more positive attitudes. Attitudes towards older adults could be a factor in the extent to which people pay attention to older adults who may be missing; therefore, we believe a measure participants' attitudes about older adults may be related to participants' ability to recognise missing couple in the mock SA in the present studies.

Own-Race Bias research studies (Brigham et al., 1985; Valentine et al., 1995) led to research on the effect of contact and experience with older adults and the resulting attitude towards older adults. Knowledge of the elderly contributes to more positive attitudes towards older adults as well as reducing anxiety about ageing (Allan & Johnson, 2008). The amount of contact with older adults may relate to face identification ability of older adults by young participants. For example, Gorelik et al. (2010, p. 263) found that, in undergraduate students, amount of contact with older adults was positively related with the participants' interest in ageing. The researchers further stated that, 'Interest in aging proceeds along a continuum, from preceding factors to initial interest in ageing and then to substantial interest in ageing. Aging courses and opportunities for interaction with older adults should be offered at the undergraduate level.'

When an older adult suffering from a form dementia has access to a vehicle, the driver may become confused and lost. When a Silver Alert is posted for a couple who has access to a vehicle it is suggested to report where they were last seen, and the make, model, colour, and number plate of the couple's vehicle. For example, the Mississippi Department of Public Safety (n.d., para. 2) states on their website that 'If the person missing is believed to be in a vehicle, information and photos can be sent to statewide communication systems, news media and other public communication resources'. The California Highway Patrol government website (n.d., para. 3) under 'What Should the Public Do' states that 'If you locate a person who has been identified as missing, call 911 immediately to report their location. Be sure to make note of their location, the direction of travel, and make, model, color, and license plate number (if possible) of any vehicle involved.' Public information in a Silver Alert may consist of the name and description of the missing person and a description of the missing person's vehicle and license plate (Carson et al., 2015). In 2019 a couple from Wisconsin disappeared on Thanksgiving Day after leaving a family gathering in Black Earth at about 3 pm that day. Family members reported them missing after they failed to arrive at their destination. A Silver Alert was posted for the missing couple through Friday and Saturday until authorities found their vehicle on Saturday morning. According to the Wisconsin Department of Justice, the black Dodge Calibre was found on a remote trail outside community of Vermont which is only five miles from where they had spent Thanksgiving Day. Although this couple's story ended tragically, the information about their make, model, and year of their vehicle helped in locating the couple. In the present study, we included information about the vehicle associated with the missing couple and asked participants to attempt to identify it.

The present research

A limited amount of previous research on recognition of missing older individuals has investigated recognition for individual missing persons. Our goal was to extend this research to situations in which an elderly *couple* is reported as missing. The focus of the current research was to investigate the ability of participants to recognise faces of an elderly, Caucasian couple, a male and a female (in their 80s) who were presented in both a Silver Alert and shown in a short home video. In addition to measuring recognition rates for an elderly couple, we were interested in whether recognition would be related to individual differences (participant gender, race, attitudes toward the elderly, and contact with the elderly). Further, previous research on face identification has indicated that participants' metacognition is an important factor, such as their confidence that they have made a correct decision about having seen the missing person or not. Thus, we included the metacognitive measures of Prediction of Knowing (POK) – how likely participants feel they would be able to later recognise the missing individual – and their confidence ratings during the recognition phase of the study.

Study 1

We explored recognition of the target individuals in relation to participant gender, race, attitudes towards older adults, and contact with older adults. We predicted that female participants would be more likely than male participants to recognise the target woman, based on past research studies supporting females' superior face identification ability. We did not predict a difference in accuracy related to participant race, consistent with previous Silver Alert studies. We predicted that recognition of the target individuals would be related to scores on the ATOA instrument, such that those who recognised the targets would tend to have more positive attitudes. We also predicted that participants who recognised the targets would tend to report greater levels of contact with older adults.

The video of the missing couple that we presented to participants provided an opportunity to test recognition for a vehicle. Ability to recognise a vehicle connected with a missing older adult (or couple) could be important, as identification of the vehicle could be of assistance in locating the missing individuals. We predicted that recognition rate for the target vehicle would be relatively low compared to recognition of the missing woman and man, based on research that faces are typically recognised faster and more accurately than objects (Ryan & Gauthier, 2016). In the present study, the vehicle was shown parked on a street behind the two targets in the study, with the two individuals shown up close; thus we expected that participants would attend less to the vehicle and be less likely to recognise it.

METHOD

Participants

The participants were recruited from a Southeastern US university using SONA, a research management system that allows students to sign up for research studies online and to obtain credit for participation. Of the 93 individuals who responded, we eliminated data from five who reported being unable to view the video in addition to deleting data from three individuals who indicated they had prior familiarity with someone shown in the study. Of the 85 remaining participants, 57 identified as female and 28 as male, and participants identified their race or ethnicity as follows: 62 Caucasian, 13 African-American, 8 Hispanic, 1 African-American/Caucasian, and 1 not responding. Mean age in years was 19.70 ($SD = 3.08$).

Materials

We administered the study using Qualtrics, an online survey/experiment platform. Participants could access the study by clicking on a link created by the researchers.

A home video was made of the target couple by their daughter. The video was 42 seconds in duration and showed the couple returning from a walk and greeting their daughter, who was visiting them for the day. Both of her parents had equal speaking time in the video. In the background, there was a vehicle clearly in view. This was important because the mock Silver Alert stated that the couple was said to have been last seen in the vehicle.

We created a mock Silver Alert using a typical missing person's poster seen on television. The Silver Alert was created in a PowerPoint slide with voice-over and automatic progression, saved into an mp4 video and uploaded into Qualtrics. The Silver Alert showed the couple together, then separately with the targets' descriptions (name, age, height, weight, last place seen; see Appendices A & B).

To measure participants' attitudes regarding older adults, we used the Attitudes Toward Older Adults scale (ATOA; Kogan, 1961). The scale consisted of 34 questions on a six-point response scale with choices ranging from 'strongly agree' to 'strongly disagree', with higher total scores indicating more negative attitudes. This instrument is intended to measure stereotypes of the aged and people's image of older adults. It has 17 positively worded items and 17 negative items. The scale consists of three domains: personal appearance, resemblance, and the nature of interpersonal relations across age generations. In the original study, Kogan tested his instrument with students in psychology classes, which included 314 subjects from Northeastern University and 168 subjects from Boston University. The overall Cronbach's alpha reliability for the ATOA (Kogan, 1961) was reported to be .81. Content and construct validity for the ATOA have been supported in more recent studies, such as a Chinese study with a reported construct validity of .92 (Yen et al., 2009) and a Turkish version of the scale at .94 (Erdemir et al., 2011).

We measured participants' experience with older adults using a four-point response scale. Participants provided ratings for each of four age groups (adults 50–59, 60–69, 70–79, and 80 and older). The prompt indicated, 'Below is a list of different age groups. We would like to know about your experiences with members of those groups. For each group, indicate how much experience you have interacting with those age groups in the past five years. I have _____ experience interacting with adults this age,' with the four options being 'no/very little/moderate amount of/great deal of'. Participants also self-reported contact with older adults, categorised as none, 1–3, 4–8, or over 9 hours per week. Demographic questions were asked at the end of the study that included the participant's age, race, and whether they received AMBER or Silver alerts on their cell phones. We also used a Prediction of Knowing (POK) scale from 0 = 'I am positive I will not recognise the male/female in the Silver Alert,' to, 100 = 'I am 100% certain I will be able to recognise the missing couple from the Silver Alert.'

A total of 30 photographs were used in the recognition phase of the study. Twenty-six were foils (meaning not the target male and female in the study) who were about the same age as the target male and female. Additionally, two different photographs of the targets (with and without glasses) were used. Most of the foils looked like the older adults (e.g., same colour of hair or eye colour, similar face shape and complexion colour, and some of the foils looked noticeably different (e.g., different colour of hair, eye colour, skin complexion). Examples of the similar and dissimilar foils can be found in Appendix E. Similarity was evaluated by a separate sample of 40 undergraduate students who separately ranked the photos from most to least similarity with the target. Ten photos were eliminated that did not fit the criteria or had specific characteristics that could stand out (such as a noticeable mole, or unusually large ears). The remaining 30 photos were re-ranked from most like to least similar to the target. Four photos of SUV's were shown to participants at the end of the study, one being the SUV parked in front of the senior citizen's home (see Appendix B).

Procedures

After the participants agreed to participate, they saw the following message: 'You are now going to see a Silver Alert Poster. You may take your time to study the poster.' The next screen showed a photo of the couple (see Appendix A). Immediately following the photo of the missing senior citizens, the participants saw a slide of the description of the couple including age, hair colour, eye colour, height, and weight. A phone number was also provided to make the poster appear as realistic to a Silver Alert as possible (see Appendix B). Next, a message was presented to the participants which stated: 'You are going to be watching a short video that lasts approximately 42 seconds. Please make sure the volume is turned down so as not to distract others (e.g., if you are in a computer lab or library participating in the study).' The video showed the participants returning from a walk and walking up to their daughter in front of their house. Equal time was given to the couple to speak to the daughter about activities they had planned for their week.

After viewing the video, participants providing a Prediction of Knowing (POK) on a scale from 0 = 'I am positive I will not recognise the male/female in the Silver Alert, to, 100 = 'I am 100% certain I will be able to recognise the missing couple from the Silver Alert.' After participants answered the POK following the video of the couple, they were asked to respond to a demographics scale including age, race, and gender, followed by the amount of contact with elderly individuals (hours per week). Participants were then asked to respond to the ATOA scale.

Next participants responded to demographic questions including gender, age, and race or ethnicity and questions about their amount of experience with different age groups (little, moderate, great deal). We then asked questions relating to SA: Do you receive Silver Alerts on your cell phone? ('yes' or 'no'). Do you receive AMBER alerts on your cell phone? Do you look at missing persons posters when you are in Wal-Mart (a food and department store)? Do you think Silver Alerts help to find missing older adults? If you had an older adult in your life who went missing would you want a Silver Alert posted of them? Did you know that SA also include individuals aged 18 and older who are missing with psychological and physical disabilities? Do you have any suggestions for improving older adult alerts when they are missing, such as cell phones, social media, and SA posters?

Additional questions included: Do you enjoy doing activities with older adults (e.g., cooking, scrapbooking, playing checkers, or going to cinema)? We then asked who the participants lived with: mother, father, grandparents, other. Next, we asked how much time during the week they cared for an older adult who is not a family member: none, 1–4 hours, 5–10 hours, 11–15 hours, over 15 hours per week.

We then presented four photographs of the same type of SUV that was seen in the background of home video. We presented a blue, white, burgundy, and grey SUV. The photographs of the SUVs were presented in random order. After viewing each of the photographs of the SUVs the participants were asked if this type of SUV was seen in the video, then, to rate their confidence level over their response on a scale of 0 = not confident at all to 100 = absolutely positive the SUV was in the video.

Lastly, we presented the 30 photographs, 15 females and 15 males all about the same age of the target male and female (84 and 86 years of age). Twenty-six photographs were foils and four of the photos were of the targets in the study (two photos of the male and two photos of the female). The 30 photos were in random order. Each photo appeared sequentially on the screen and the participants were asked to respond 'yes' or 'no' to the question: 'Was this male (or female) in the Silver Alert?' The participants, unknowingly, were being timed during their decision. Next, the participants were asked to rate how confident they were in their decision of whether the person was in the Silver alert or not on a scale of 0–100.

RESULTS

Overall, 47 participants (55.3%) correctly identified the missing female senior citizen and 72 (84.7%) correctly identified the missing male senior citizen. A McNemar test for dependent proportions indicated that the difference in recognition rate was significant, $\chi^2(1, N = 85) = 16.45, p < .001$. Thirty participants (35.3%) correctly identified the target vehicle. False alarm rates were 8.3% in responding to female distractor photos, 6.8% in responding to male distractor photos, and 26.7% in responding to distractor vehicle photos.

Participant gender was not significantly related to recognition of the female target, $c^2(1, N = 85) = 0.50, p = .481$, or the male target, $c^2(1, N = 85) = 0.21, p = .645$. Similarly, when comparing Caucasian participants to participants of other ethnicities, there was no relationship with recognition of the female target, $c^2(1, N = 85) = 0.12, p = .725$, or male target, $c^2(1, N = 85) = 0.11, p = .744$. Self-reported contact with older adults, categorised as none, 1-3, 4-8, or over 9 hours per week, was not associated with recognition of either the female target, $c^2(1, N = 85) = 2.48, p = .478$, or the male target, $c^2(1, N = 85) = 4.18, p = .243$.

We conducted a logistic regression analysis to predict whether or not participants recognised the female target ('yes' response to her target photo) from metacognitive measures (POK, target confidence, and mean female distractor confidence ratings), participant age, score on the ATOA, and response time to the target photo. Response time was measured as the amount of time the page showing the target photo was viewed prior to the participant choosing a response. We used the backward stepwise Wald method. The final model included only ATOA scores as a predictor (odds ratio of .95, $p = .006$), with higher ATOA scores (representing more negative attitudes) predicting lower likelihood of recognising the female target. This model was significant, $c^2(1, N = 85) = 8.90, p = .003$, Nagelkerke $R^2 = .133$.

Similarly, we conducted a logistic regression analysis to predict recognition of the male target. The final model included ATOA scores (odds ratio of .96, $p = .058$), with higher ATOA scores (representing more negative attitudes) predicting lower likelihood of recognizing the target, and target confidence rating (odds ratio of 1.03, $p = .010$), with higher confidence ratings predicting increased likelihood of recognizing the target. This model was significant, $c^2(2, N=85) = 10.33, p = .006$, Nagelkerke $R^2 = .199$.

Finally, we conducted a logistic regression analysis predicting recognition of the target vehicle from target confidence rating, distractor vehicle confidence rating, and participant age. The final model included only distractor confidence rating as a predictor (odds ratio of 1.04, $p < .001$), with higher confidence ratings predicting increased likelihood of recognizing the target vehicle. This model was significant, $c^2(2, N = 85) = 22.45, p < .001$, Nagelkerke $R^2 = .319$.

DISCUSSION

In study 1, participants viewed an elderly couple in their mid-80s in a typical Silver Alert format as seen on television or on a poster distributed in public, as well as in a home-made video of the couple returning from a walk and greeting their daughter. Study 1 included several measures that we believed could be related to face identification of an elderly couple in a Silver Alert.

We had predicted females would outperform males on recognizing the female target in particular, based on past studies showing females demonstrating superior face identification for their own gender (OGB) (McKelvie, 1987). Although female participants have been consistently found to be better at recognising female faces than male faces (e.g., Cross et al., 1971; Lewin & Herlitz, 2002; Rehnman & Herlitz, 2006, 2007; Wright & Sladden, 2003), the results for male participants in some studies have been mixed. For example, Herlitz and Lovén (2013) found that girls and women outperform boys and men if only male faces are presented. Our results did not indicate a gender difference in recognising either target individual, supporting previous findings that there is not a female advantage for accurately recognising the target male when presenting both male and female faces. The results did not indicate a difference in target recognition related to participant race, consistent with previous Silver Alert studies (Gier, 2019; Gier & Kreiner, 2020a; 2020b).

We predicted that recognition of the target individuals would be related to lower scores on the ATOA instrument, reflecting fewer negative attitudes toward older adults. This hypothesis was supported for recognition of both the male and female targets, with ATOA scores emerging as a significant predictor.

Additionally, we also predicted that greater levels of reported contact with older adults would predict recognition of the target. Contact was not significantly associated with the recognition of either of the targets. Contact and experience with older adults in past studies have shown positive effects regarding attitudes towards the elderly (Angiullo et al., 1996). The measure of contact in the present study was based on the participant selecting an option for a range of hours of contact per week. This type of measure may be limited in precision and reliability. It may be helpful to provide participants with examples of explicit positive and negative experiences with older adults and ask participants to report those experiences.

An interesting finding was that confidence ratings were predictive of target recognition for the male target, but this relationship did not occur for recognition of the female target. Given that the study included only the two target individuals, it is difficult to determine whether this difference in metacognitive performance relates to the gender of the 'missing' person or to some other difference between the two targets. It is possible that the relationship between confidence and recognition is stronger in general as target recognition increases, as confidence may not be a good metacognitive indicator when recognition rates are lower.

We hypothesised that recognition of the target vehicle would be relatively low, and indeed it was substantially lower than recognition rates of the male or female targets. This was despite the fact that only four vehicles were shown in the recognition phase, whereas 15 male and 15 female target photos were shown. However, the vehicle was in the background when shown in the video, so this result is perhaps not surprising. Recognition of the vehicle was predicted by confidence ratings for the distractor vehicles, indicating that metacognitive judgements related to recognition of an associated vehicle may have some value.

Study 2

To our knowledge, these are the first studies on recognition of a missing couple shown in a Silver Alert-style missing person's announcement. Thus, we felt it was important to replicate the study with a larger sample. Further, we wondered whether the way the couple is presented in the video might affect recognition. In study 1, missing woman and man were presented together, in the same video that participants watched after seeing the Silver Alert. It is possible that presenting the two individuals separately could encourage people to focus more on their individual features than a situation in which the individuals appear together, resulting in a higher likelihood of recognition.

When a SA of a missing couple is shown on the news as a special alert, the couples are typically first shown together, then sometimes, viewed separately. Although the SA context is not the same as conducting an eyewitness line-up, the number of individuals shown to participants may be an important factor in both contexts. Studies of eyewitnesses asked to pick a perpetrator from a line-up have shown that sequential presentation appears to be the superior method, possibly because simultaneous presentation of the possible perpetrators tends to lead victims to compare the faces presented, often ending in false alarms when non-perpetrators are identified from the line-up (Patterson & Baddeley, 1977). In Study 2, we manipulated whether participants saw the couple together, as in Study 1, or in separate videos, and also included a control condition in which a different couple was presented in the video than the target couple shown in the Silver Alert.

METHOD

Participants

The participants were recruited from a Southeastern U.S. university using SONA, as in Study 1. Of the 1,654 individuals who responded, we eliminated data from 27 who reported being unable to view the video and from three individuals who indicated they had prior familiarity with someone shown in the study. Of the 1,627 remaining participants, 1132 (69.7%) identified as female, 482 (29.7%) as male, and 10 (0.6%) as other, with 3 participants not responding. Participants identified their race or ethnicity as follows: 1,258 (77.3%) Caucasian, 229 (14.1%) African American, 50 (3.1%) Hispanic, 21 (1.3%) Native American, 21 (1.3%) Asian, 42 (2.6%) other, and 6 not responding. Mean age in years was 19.66 ($SD = 5.12$).

Materials

The same materials were used as in Study 1 with the following exceptions. Separate videos and Silver Alerts of each of the two senior citizens were made. In order to ensure that the videos would be the exact length as when participants viewed the couple together, the videos were edited so that each of the 'separate' videos (male and female) were 21 seconds long, half the time of the video of the couple together. The videos were recorded at the same location. The conversation with the daughter took place separately with the female or male senior citizen alone instead of being in the video together. (Appendix A shows screenshots of the couple together; Appendix B shows screen shots of the couple in separate videos). Additionally, we added a video of a control couple (Neither were in the mock Silver Alert; see Appendix C).

Procedures

The procedure was the same as in Study 1 with the following exceptions. The two senior citizens were shown in separate Silver Alerts as well as separate home videos. We added a control condition in which videos of another older adult couple was shown in place of the missing senior citizens from the Silver Alert. Each participant was randomly assigned to one of three conditions: couple together (as in Study 1), couple separate, control condition. In the couple separate condition, we counterbalanced the order of photos and videos of the missing woman and man.

RESULTS

Overall, 921 (56.7%) of 1625 participants responding to the photo of the missing female correctly recognized her from the Silver Alert, while 1218 (75.0%) participants responding to the photo of the missing male recognized him from the Silver Alert. The number of participants recognizing the target vehicle was 652 (40.4%). False alarm rates were as follows: female distractors (7.2%); male distractors (7.7%), distractor vehicles (21.1%).

We conducted chi-square tests of independence to determine whether the three conditions differed significantly in recognition of the target female or the target male, with z-tests for proportions to specifically compare each condition to the others. The conditions did not differ significantly in recognition of the target female, $\chi^2(2, N=1625) = 0.74, p = .690$. There was a significant difference in recognition of the target male, $\chi^2(2, N = 1625) = 7.42, p = .024$, with significantly greater recognition in both the Couple Together condition (78.0%) and the Couple Separate condition (75.4%) as compared to the Control condition (70.9%), with no significant difference between the Couple Together and Couple Separate conditions.

We compared the three conditions on the following dependent variables with regard to both the target female and target male: Prediction of Knowing (POK), target photo confidence rating, mean confidence rating to the five most similar distractors (MSD), false alarm rate, and false alarm rate to the five most similar distractors. Table 1 shows descriptive statistics, *p*-values, and effect sizes. We also conducted two planned contrasts for each dependent variable: (1) a comparison of the Couple Together vs Couple Separate conditions; and (2) a comparison of the Couple Together and Separate conditions vs the control condition.

We found significant differences across the three conditions on POK for the target female and for the target male as well as on mean confidence ratings to the most similar distractors for both the female and male (see Table 1). For all four of these dependent variables, the second but not the first planned contrast was significant ($p < .001$ for POK female and male; $p = .002$ for mean confidence MSD female and $p < .001$ for mean confidence MSD male). This pattern of results indicated that participants who watched a video of the missing couple as compared to those who watched a control video were more confident they would later recognize the target individuals and were also more confident in responding to photos of the most similar distractors during the recognition phase. Differences between the Couple Together and Couple Separate conditions were not significant. However, participants in the Couple Separate condition were more confident than those in the Couple Together in their response to the target female ($p = .015$) photo, while confidence ratings for the target male photo were lower in the control condition as compared to the other two conditions ($p = .021$). False alarm rates to MSD for the male were significantly higher in the control condition than in the other two conditions ($p = .009$). Remaining planned contrasts were not significant.

We conducted a logistic regression analysis to predict whether or not participants recognized the female target ('yes' response to her target photo) from metacognitive measures (POK, target confidence, and mean female distractor confidence ratings), participant age, score on the ATOA, and response time to the target photo. We used the backward stepwise Wald method. The final model included ATOA scores (odds ratio of .99, $p = .039$), with higher ATOA scores (representing more negative attitudes) predicting lower likelihood of recognizing the female target, and confidence ratings to distractors (odds ratio of 1.01, $p < .001$), with higher confidence ratings predicting increased likelihood of target recognition. This model was significant, $\chi^2(2, N = 85) = 30.91, p < .001$, Nagelkerke $R^2 = .025$.

When predicting recognition of the male target, the final logistic regression model included ATOA scores (odds ratio of .98, $p < .001$), with higher ATOA scores predicting lower likelihood of recognizing the target, and target confidence rating (odds ratio of 1.02, $p < .001$), with higher confidence ratings predicting increased likelihood of recognizing the target. This model was significant, $\chi^2(2, N = 85) = 117.67, p < .001$, Nagelkerke $R^2 = .104$. A

logistic regression analysis predicted recognition of the target vehicle from target confidence rating, distractor vehicle confidence rating, and participant age. The final model included only target confidence rating as a predictor (odds ratio of 1.02, $p < .001$), with higher confidence ratings predicting increased likelihood of recognizing the target vehicle. This model was significant, $c^2(1, N = 85) = 106.63, p < .001$, Nagelkerke $R^2 = .087$.

Self-reported hours per week spent with older adults, recognized as none, 1–3, 4–8, or over 9 hours per week, was not associated with recognition of either the female target, $c^2(1, N = 1619) = 5.57, p = .134$, or the male target, $c^2(1, N = 1619) = 1.86, p = .602$.

A comparison of Caucasian participants to participants of other ethnicities indicated no significant difference in recognition of the target female, $c^2(1, N = 1625) = 0.92, p = .338$, but the relationship between ethnicity and recognition of the target male was significant, $c^2(1, N = 1625) = 8.33, p = .004$, with 76.6% of Caucasian participants and 69.2% of participants of other ethnicities recognizing the (Caucasian) target male. Participants identifying as female and male did not differ on recognition of the target female, $c^2(1, N = 1612) = 0.97, p = .324$, or on recognition of the target male, $c^2(1, N = 1625) = 1.67, p = .196$.

Table 1

Study 2 Comparison of the Couple Together, Couple Separate and Control Conditions on Prediction of Knowing (POK), Target Confidence, False Alarm Rate (FAR) in Percent and False Alarm Rate to Most Similar Distractors (FAR MSD)

Dependent Variable	Condition						F	p	χ^2
	Control		Couple Separate		Couple Together				
	M	SD	M	SD	M	SD			
POK Female	63.95	23.10	71.12	22.16	69.47	22.44	14.33	< .001*	.016
Confidence Female	72.53	26.33	75.84	26.23	71.95	26.93	3.36	.035	.003
Confidence MSD Female	79.54	20.92	83.99	18.05	81.76	20.73	6.37	.002*	.007
FAR Female	7.76	12.14	6.39	9.68	7.40	11.57	2.09	.124	.001
FAR MSD Female	11.60	17.17	10.08	16.12	10.58	16.46	1.13	.324	.000
POK Male	64.69	23.34	72.15	22.32	73.47	21.66	23.71	< .001*	.027
Confidence Male	79.28	25.1	83.62	23.22	81.04	25.63	4.00	.019	.004
Confidence MSD Male	79.58	21.95	83.99	18.61	82.83	20.72	6.41	.002*	.007
FAR Male	8.40	11.76	6.99	10.04	7.71	11.77	2.03	.132	.001
FAR MSD Male	10.17	16.59	7.61	13.17	8.50	15.08	3.86	.021	.004

*Significant with Bonferroni correction

DISCUSSION

In study 2 we replicated study 1 with a larger sample while also manipulating whether the couple appeared together, separately, or did not appear in the alert (control condition, Appendix C). We found no differences in accuracy for either the male or female target depending on whether the target individuals had appeared separately or together. For the male but not for the female target, there was significantly greater recognition in both the Couple Together condition and the Couple Separate condition as compared to the control condition, suggesting that participants were recognizing the male target at an above chance level but may have been essentially guessing in their attempts to identify the missing female.

Study 2 results showed that recognition of the targets was associated with more positive attitudes about the elderly, similar to the findings in Study 1 ATOA was a significant predictor in the logistic regression model for both males and females in study 2, with a much larger sample size.

Similar to Study 1, we did not find evidence of an advantage in recognition for female participants, although previous research has indicated superior face identification ability for females (Bate, et al, 2019; Herlitz & Lovén, 2013; Hills et al., 2018; Lovén et al., 2011). As in Study 1, the lack of gender differences in Study 2 may be due to the inclusion of both male and female faces in the recognition phase. However, recognition was substantially greater for the missing man than for the missing woman in both studies. This result should not be generalised to men and women in general as the present studies included only two specific individuals as targets for recognition. However, the difference in recognition rates implies that we should not assume uniform levels of recognition for the two members of a missing couple.

Also similar to Study 1, we did not find evidence supporting the hypothesis that participants who recognized the targets would tend to report greater levels of contact with older adults. As noted for the Study 1 results, it may be worthwhile to explore ways of measuring contact that are more specific and varied. Further, recognition of the vehicle associated with the missing couple was relatively low compared to recognition of the missing man and woman.

GENERAL DISCUSSION

There were several findings that were consistent across the two studies. Participants were more likely to recognise the man than the woman in both studies. Past studies have repeatedly shown a strong OGB, especially women recognising other women more than males. It may be useful in future research to explore the role of target attractiveness in recognition, as it is possible that the differences in recognition we observed could be

related to perceived 'cuteness' of the targets. Targets perceived as more attractive may elicit additional attention, making it more likely that the individual could later recognise the person. It would be necessary to collect data on participants' perceptions of target attractiveness level to explore that possibility.

Another important finding across both studies was the association of more positive attitudes about the elderly with likelihood of recognizing the missing person. This is an important finding related to face identification of older adults in Silver Alerts. If attitudes are related to better face identification of the elderly, perhaps increasing exposure to positive older adults may change attitudes towards older adults for those who have had more negative experiences with the elderly or otherwise hold negative age-related stereotypes. Research with people entering nursing degree programmes has shown that nursing students with higher ATOA scores (meaning they have negative attitudes towards older adults), but are later exposed to older adults whom they have positive experiences with, show a decrease in their negative attitudes towards older adults as well as their own fear of aging (Gibbs & Kulig, 2017). Gibbs and Kulig (2017) showed that when instructors of a nursing program demonstrated characteristics such as caring, enthusiasm, and critical thinking, students in the nursing programme learned respect and more caring towards the elderly residents. 'As role models, instructors also supported students through fostering confidence, creating a safe environment, and helping students to diversify their knowledge' (p. 74). Having positive role models to promote positive rather than negative attitudes towards older adults could contribute to more of the population paying closer attention when an older adult is goes missing.

Research on Silver Alerts is particularly important at this time in our history, as over the next three decades those over 65 years of age are predicted to be an increasing proportion of the population. Aspects of research on AMBER Alert can be seen as analogous with issues in Silver Alerts. For example, Lampinen et al. (2009) sought to determine how many customers in a supermarket would take the time stop and look at AMBER alert photos of real missing children that were both posted in plain sight of everyone entering and exiting the store. Their results were sobering as 'most customers reported either not looking at the posters or only briefly looking at the posters' (p. 404). If people have become complacent about looking at photos of missing children, the same could be predicted for Silver Alert posters placed in public places.

We believe it is necessary to point out that local and national TV stations show photos of people wanted by law enforcement, as well as AMBER alerts for missing and/or abducted children; however, Silver Alerts do not appear to be used as widely. Perhaps we see fewer Silver Alerts on television because by the evening news the elderly, missing person was found; however, tragically, many older adults who wander away from home fatal endings to their lives. A question for researchers is how we can prepare the public for better recognition in a future where the elderly population outnumber all other age groups. We believe one solution could be exposing younger age groups to older adults, such as the Adopt a Grandparent Program. An article on the Good Morning America's (GMA) website showed that when 'Over 67,000 volunteers signed up virtually during the international Covid-19 pandemic for an "Adopt a Grandparent" program, the program became so popular that now there is a waiting list for adoptees' (McLellan, 2020). McLellan, based in the United Kingdom, stated the programme began as an alternative to the in-person Adopt a Grandparent programme due to COVID-19. She stated that an 'Adopt a Grandparent' virtual programme has received an influx of virtual volunteers amid the COVID-19 pandemic. This is one way of introducing older adults to younger people. It would be interesting to conduct a study in which college students sponsor an 'Adopt a Grandparent' to determine whether their ability to recognise faces of older adults improves over the course of the programme. More research will be needed in order to implement programmes based whether these programs help new generations of young adults to better recognise a missing senior citizen. It is important to note that the results of the current studies did not support a relationship between contact with older adults and target recognition; however, further research is needed to determine whether this was a result of the particular measure that we used.

Further, longitudinal studies are needed to better understand the effect of attitudes toward older adults on face identification as a result of participation in community programmes, as well as to test the validity of whether community implemented programmes improve recognition of older adult faces. Based on studies looking at contact with older adults, those who reported spending time with the elderly and having positive experiences reported fewer negative attitudes towards older adults. According to Tovel et al. (2019), adults who are over the age of 50 tend to show more positive attitudes towards older adults when the older adults appear to be in better physical condition and displaying positive cognitive functioning versus those with physical or psychological diseases (Sargent-Cox et al., 2012); therefore, exposing more people to those with dementia in a positive setting may help to change negative attitudes towards older adults.

A unique aspect of the present studies was that we both presented a Silver Alert and a home video showing the couple. This may have resulted in increased levels of recognition of the missing seniors compared to situations in which only a Silver Alert is shown. In a 2016 study, Gier et al. presented an elderly woman who was seen by participants either walking around a playground with children playing in casual clothes, or in her nightgown. A control senior was also used in a third video. The researchers had predicted that participants would recognize the woman in her nightgown more than when she had been seen wearing casual clothing or the control senior; however, participants recognised the woman dressed in casual clothes more than in the other two conditions. What makes this study important in relation to the current studies is that only about 10% of their participants who had seen the woman in the video recognised the woman, whereas the recognition rates were substantially higher in the present studies.

An important limitation of the present research is that both studies included the same older adult couple in the Silver Alert (Caucasian couple) so the results may not generalise to other missing couples. We suggest replicating our study including multiple couples from different races and ethnicities to increase ecological validity. It will be necessary in future research to replicate the present findings with different individuals to ensure that any differences are not the result of specific characteristics of the couple.

A second limitation is that the present samples consisted of college students who were mainly young adults. Thus, it is important to extend research on recognition of missing elderly couples to different age groups as well as comparing age groups on recognition levels. Silver Alert (or AMBER alert) including a teen, their parent, and a grandparent would be interesting to see if an age effect would appear. According to the OAB, participants would be predicted to identify the person closer to their age compared to a middle aged or an older adult (Anastasi, & Rhodes, 2005).

We should also note the limitation of collecting data online as opposed to in person. As the researchers were not physically present during data collection, it is difficult to determine whether all participants followed all instructions or whether they had distractions in their environments. However, this mode of data collection may also increase ecological validity as individuals typically see missing person alerts in their own environments rather than in laboratory settings.

CONCLUSION

Although demographic trends predict both increasing numbers of elderly individuals and increasing numbers of elderly individuals who may go missing, there are only a few studies in addition to the present research that examine how well people can identify missing elderly persons based on a missing person announcement (Silver Alert). The present two studies are the first to investigate recognition based on an alert in which a missing couple, rather than a missing individual, is shown.

One factor that may be important is individual differences, and the present study provided support for the hypothesis that recognition tends to be higher by individuals with more positive attitudes toward the elderly. Future research should explore whether educational programmes could both change attitudes toward the elderly and increase the likelihood of recognising missing elderly persons.

In both studies, we found that the missing elderly man was more likely to be recognized than the missing elderly woman. Because these results are limited to two studies using the same two target individuals, we cannot conclude that the difference reflects a general disadvantage for recognizing elderly females compared to males. However, this pattern of results does suggest that we should not assume equal recognition by the public of both individuals in a missing couple. Further research is needed with more diversity in the missing individuals as well as more diversity (especially in ethnicity and age) in the participants.

Continued research on recognition of missing individuals shown in Silver Alerts is important due to the enormous number of older adults predicted in the next three decades. As the projected demographic trend of increases of the elderly population will likely result in an immense strain on the younger generations in caring for the elderly, we believe it is important to have effective systems in place for locating missing older adults. Every family member of a missing older adult's worst nightmare is their loved one aimlessly wandering away from and never return home safely.

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Appendix A

Study 1

The missing couples and description of the missing couple in a Silver Alert were presented simultaneously



Missing couple in the Silver Alert



Photo Clip from home video

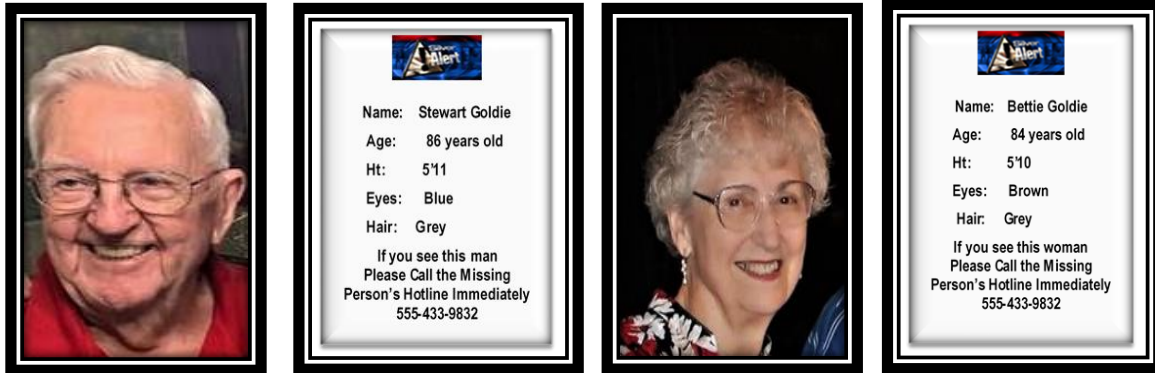
Name: Stewart Goldie		Name: Betty Goldie
Age: 86 years old		Age: 84 years old
Ht: 5'11		Ht: 5'10
Wt: 180		Wt: 124
Eyes: Blue	If you see this couple Please Call Immediately	Eyes: Brown
Hair: Grey	555-433-9832	Hair: Grey

Information presented in Silver Alert

Appendix B

Study 2

The missing couples and description of the missing couple in a Silver Alert presented sequentially



Photos of the missing targets in a Silver Alert presented sequentially



Female Target in Video

Target Vehicle

Male Target in Video



Target Vehicle

Similar make, model, and year of the Target Vehicle

Appendix C

Study 2

Control condition of a couple together but not presented in the Recognition Phase



Screenshot of control older adult in video

Appendix D

Examples of photos used in the study that were either similar or dissimilar to the target female



Target Female in Recognition Phase



Similar Foil



Similar Foil



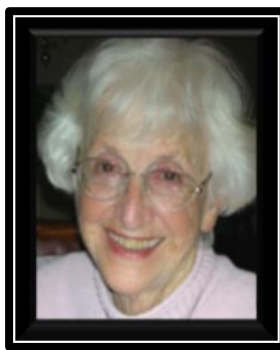
Similar Foil



Similar Foil



Dissimilar Foil



Dissimilar Foil



Dissimilar Foil



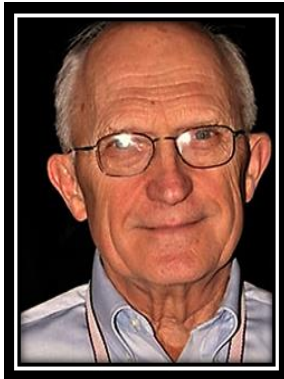
Dissimilar Foil

Appendix E

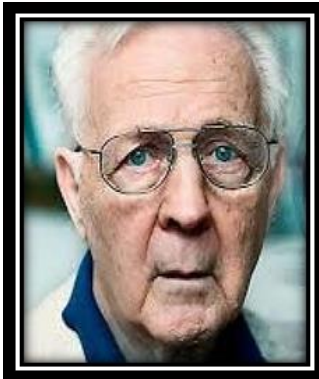
Examples of photos used in the study that were either similar or dissimilar to the target male.



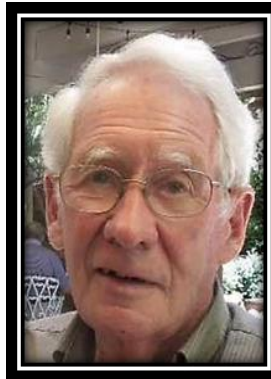
Target Male in Recognition Phase



Similar Foil



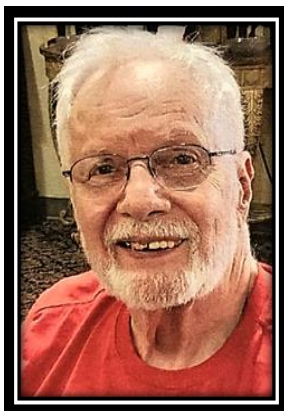
Similar Foil



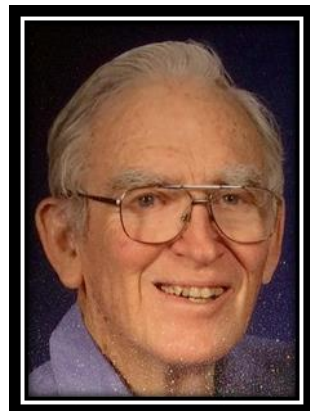
Similar Foil



Similar Foil



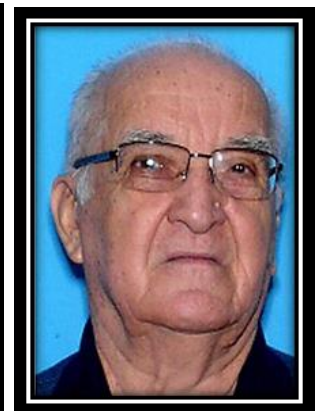
Dissimilar Foil



Dissimilar Foil



Dissimilar Foil



Dissimilar Foil