AGE-RELATED DIFFERENCES IN DECEIT DETECTION: THE ROLE OF EMOTION RECOGNITION

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AGE-RELATED DIFFERENCES IN DECEIT DETECTION:
THE ROLE OF EMOTION RECOGNITION

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

This study investigated whether age differences in deceit detection are related to impairments in emotion recognition. Key cues to deceit are facial expressions of emotion (Frank & Ekman, 1997). The aging literature has shown an age-related decline in decoding emotions (e.g., Malatesta, Izard, Culver, & Nicolich, 1987). In the present study, 354 participants were presented with 20 interviews and asked to decide whether each man was lying or telling the truth. Ten interviews involved a crime and ten a social opinion. Each participant was in one of three presentation conditions: 1) visual only, 2) audio only, or 3) audio-visual. For crime interviews, age-related impairments in emotion recognition hindered older adults in the visual only condition. In the opinion topic interviews, older adults exhibited a truth bias which rendered them worse at detecting deceit than young adults. Cognitive and dispositional variables did not help to explain the age differences in the ability to detect deceit.

CHAPTER 1

INTRODUCTION

Consider the following news story:

> Two men in their twenties visit an 87-year-old woman's home in Florida and tell her they are there to follow up on previous work done on her roof. After spending less than an hour on her roof and spray-painting it silver, they tell her she owes them $2,700 cash.

Unfortunately, scams like these are extremely prevalent, especially for older adults. Older homeowners are popular targets for these home-repair schemes because they are likely to live in homes which need repair, and they are less likely to do the repairs themselves. In fact, the *American Association of Retired Persons* (AARP) reports that people over the age of 50 control 70 percent of the net worth of the nation's households (Morrison, 2003). More than half a million older adults are victims of financial fraud each year (Tueth, 2000). The AARP also reports that seniors are targeted in 40 percent of all fraudulent financial scams (Morrison, 2003).

The victimization of older adults is a disturbing, yet very real, concern of today's world. While the incidence of financial victimization does not increase with age, an important minority of elderly consumers are targeted by con artists who promise prizes, get-rich-quick schemes, and financial independence. These transgressions are particularly salient because we, as a society, realize the need to protect these vulnerable populations. The vulnerabilities associated with age may one day happen to each of us, so the reasons for the con artist's success in crimes against this population are important to explore. One facet of these crimes is that con artists tell lies to convince their victims to part with their money. Laboratory studies of communication research consistently report that young adults are scarcely better than chance at detecting deceit. It may be that older adults are even worse at detecting deceit, rendering the elderly even more susceptible to con artists than the general population. A review of the deceit detection literature, the aging and deception literature, and the emotion and aging literature culminate to critical predictions regarding the accuracy of older adults in detecting lies.

CHAPTER 2

LITERATURE REVIEW

2.1 Deceit Detection

Deception is defined here as a deliberate attempt to mislead others. Con artists, salespeople, politicians, and poker players often rely on the assumption that people are generally not very good at catching lies. Research on the accuracy of deceit detection has largely supported this assumption. Four decades of deception research and over 100 studies yield one major finding: overall accuracy at detecting deceit is just over 50 percent, or chance (Miller & Stiff, 1993). In fact, numerous studies report that people are actually below chance at detecting lies. In a review of 40 studies on deceit detection, the overall accuracy for detecting truths was 67 percent while the overall accuracy for detecting lies was 44 percent (Vrij, 2000). Researchers have investigated a number of explanatory approaches for this low accuracy in detecting deceit. Among these explanatory approaches are people's private decision rules for detecting deceit, familiarity with the content of the message, state and trait suspiciousness of the decoder, and the role of emotion recognition. These four explanatory approaches will be discussed in the following four sections.

2.1.1 Implicit Theories of Lie Detection

Several accurate nonverbal cues that indicate deception have been identified (DePaulo et al., 2003). In a meta-analysis of 120 independent samples, liars were shown to display fewer of the gestures used to illustrate speech, were more vocally tense, spoke in a higher pitched voice, and exhibited more pupil dilation than people telling the truth

(DePaulo et al., 2003). Perceivers seem, however, not to rely on these valid nonverbal cues.

Paradoxically, people do employ implicit theories of deceit detection when judging the veracity of a message, but they rely on invalid physical cues to identify deception. In a study examining individuals' perceptions of cues to deceit, most people, including those people who were professionally trained to recognize lying, held inaccurate beliefs about cues to deception (Akehurst, Köhnken, Vrij, & Bull, 1996). In this study, laypersons and police officers rated behaviors on the extent to which they believed the behaviors would increase or decrease during lying. The authors compared participants' ratings of behaviors frequently exhibited during deception to the actual frequencies of those behaviors during deception based on previous deception research. They found that people's beliefs regarding deceptive behavior are very different from actual deceptive behavior. In particular, many people believe that nonverbal behaviors, such as arm and leg movements and self manipulations, increase during deception when in fact they decrease (Akehurst et al., 1996; Vrij, 1991).

Participants also reported that they believe eye contact decreases when people are lying (Akehurst et al., 1996; Vrij, 1991). Careful analyses of deceptive behavior have shown that eye contact actually increases during deception. It is unclear why people rely on these invalid cues to deception as opposed to valid cues. One possible explanation lies in the fact that police manuals typically list gaze aversion and fidgeting as behaviors of liars, two invalid cues to deceit (Gordon & Fleisher, 2002). Perhaps the misinformation in these manuals has been circulated, leading to these common myths of liar behavior. The fact that people typically use invalid cues to detect deceit is surprising and disheartening.

It can also be viewed in a more positive light, however, because current research identifying valid cues to deception suggests the possibility for an intervention. If people unlearn the invalid cues and tune their antennas to recognize the valid cues to deception, they could improve their accuracy rate at detecting lies.

2.1.2 Truth Bias Heuristic

Other researchers explain our relatively poor ability to detect deceit as a result of our tendencies to limit in-depth processing of all available social information and instead utilize cognitive heuristics in everyday life. Cognitive heuristics are rules of thumb used to reduce the complexity of the environment for easier cognitive processing. The use of heuristics has both advantages and disadvantages. Heuristics are efficient, but they also render the individual susceptible to judgment biases (Tversky & Kahneman, 1974).

People have been shown to use a cognitive heuristic known as the truth bias when judging the veracity of a statement (Levine, Park, & McCornack, 1999). The *truth bias* is the tendency to judge more statements as truths than as lies. Across four studies designed to investigate the truth bias phenomenon, the percentage of total items judged as truthful was significantly greater than the percentage of total items judged as lies (Levine et al., 1999). In their third study, the familiarity of the topic in truth and lie messages was manipulated. Half of the topics discussed by targets on a videotape were current issues relevant to the campus from which participants were recruited, while the other half were issues from a different campus. Greater familiarity with a topic was hypothesized to reduce reliance on cognitive heuristics because elaborate and accurate information would be available to judge the truth of a statement. Conversely, unfamiliar topics were hypothesized to be more difficult to process, leading to a reliance on heuristic processing and thus less accurate deceit detection. Collapsing across truths and lies, overall accuracy in the familiar condition was higher (69%) than accuracy in the unfamiliar condition (48%). For detection of lies, they found that accuracy was 53 percent in the familiar condition and 27 percent in the unfamiliar condition. These findings lend support to the idea that in the unfamiliar condition participants relied on a heuristic, or a well-instantiated knowledge structure, such as the truth bias to inform their decisions of veracity. Conversely, in the familiar condition, participants were able to rely on their elaborated structural knowledge of the topic.

The truth bias is assumed to serve as a heuristic that reduces the cognitive resources required to process complex information. For this reason, researchers expected to find an increase in the use of the truth bias heuristic in situations of cognitive load. Indeed, in a study which experimentally manipulated cognitive load in young adults, increased cognitive load impaired the young adults' ability to detect lies (Millar & Millar, 1997). These studies show that the same person may vary over time in their ability to detect deceit. Depending on the amount of cognitive capacity available to devote, and the motivation to devote this cognitive capacity, people may or may not rely on the truth bias heuristic. It is important to keep in mind that laboratory studies of deceit detection rarely use personally relevant situations. The generalizability of laboratory studies to everyday deceptions may be poor because judges in laboratory studies are not motivated to deeply process their decisions.

2.1.3 Suspicion

A number of other variables have been shown to influence veracity judgments. A third explanatory approach to deceit detection is to examine the relationship between suspicion and judgments of deceit. We would expect people who are more suspicious to be more likely to suspect people of lying than people who are not. Indeed, suspicious people may exhibit a lie bias rather than a truth-bias. A *lie bias* is a tendency to judge more statements as lies than truths (Levine & McCornack, 1991).

Dating couples were tested in a study designed to investigate the roles that situationally-aroused suspicion (or state-suspicion) and generalized communicative suspicion (or trait-suspicion) play in honesty judgments (Levine & McCornack, 1991). One member of each dyad was videotaped telling six lies and six truths, and the other member of the dyad had to judge the veracity of the videotaped statements. Three between-subjects conditions of state-suspicion were induced: low, moderate, and high. In the low state-suspicion condition, the "judge" was not told about the possibility that their partner would be lying. In the moderate state-suspicion condition, the judges were told that their partners may or may not be telling the truth. And finally, in the high state-suspicion condition, judges were told that their partners were definitely lying on some of the statements. The *Generalized Communicative Suspicion* (GCS) scale, an individual difference measure created by the authors to assess trait suspiciousness, was administered to participants. Individuals who were moderate or high in trait suspiciousness were more likely to judge his or her partner's statements as dishonest than individuals with low trait suspicion.

Overall, the authors found that participants were more likely to judge their partners' statements as false (a) when they were assigned to the moderate and high state-suspicion conditions and (b) when they demonstrated higher levels of trait-suspicion.

Essentially, higher levels of induced- or individual-specific suspicion were associated with more skeptical honesty judgments.

2.1.4 Emotion Recognition

The consistent finding that we are not as good as we believe we are at catching lies seems contrary to our own intuitions about our social interactions with others. While some researchers have taken this robust finding and developed studies to investigate the mechanism for our errors, other researchers blame aspects of the typical methodology used in deception research for the surprisingly low accuracy rates. The stimuli used in much of the deception literature include either actors, or even participants, telling lies or telling truths. In most cases, the content and consequences of the messages are relatively mild. For example, actors might be asked to tell a lie or a truth about experiences from their past, such as getting lost in a shopping mall when they were a child. These statements are recorded and then participants are asked to judge each statement as a truth or a lie. Because the participants and actors in these stimuli are not invested in the results of their lies, the stimuli may lack those features of lying behavior that are critical to the construct validity of deceit detection paradigms. Namely, the stimuli are lacking emotions that are evoked when the stakes of being discovered as a liar are high.

Frank and Ekman (1997, 2004) argue that these differences between real-world lies and lies in the laboratory have led to misleadingly low accuracy rates in deceit detection. The argument is that the liars and truth-tellers of previous deceit detection research have not been sufficiently motivated. More specifically, they found that the strength of emotions induced in the liars and truth-tellers determined whether participants would demonstrate near chance or better than chance deceit detection. Essentially, if the stakes are high when a person lies, then that person will feel and display guilt, fear, and excitement. If the stakes are low, on the other hand, then liars will not adequately display feelings of guilt, fear, or excitement. These micro-expressions of emotion can reveal the liar to judges who use nonverbal cues to detect deceit.

In a study which addressed this possibility, nurses were motivated to lie convincingly by telling them that their lying performance was related to success in their nursing careers (Ekman & Friesen, 1974). Overall, observers of these messages were significantly better at detecting deceit, and those who were most accurate reported basing their decisions on nonverbal behavior. Observers who were the least accurate, however, reported using only the verbal information to make their veracity judgments.

Additional evidence for the validity of micro-expressions of emotion as valid cues to deceit comes from recent work by Frank and Ekman (1997, 2004). In these studies, liars and truth-tellers were motivated by the opportunity to earn an additional 50 dollars if they could convince the interviewer they were telling the truth. These scenes were videotaped and later showed to participants who had to judge whether each person was lying or telling the truth. When participants viewed liars and truth-tellers in this *high stakes lies* paradigm, they reached an average level of 60 percent accuracy in detecting deceit. Some participants were even at the 90 percent accuracy level. These results are in stark contrast to prior deception research, which found that people were rarely above chance at detecting deceit. Participants in this study also completed a micro-expression test in which they had to identify the emotion displayed in a series of photographs of facial expressions of emotion. Scores on the micro-expression test correlated significantly with accuracy in deceit detection. In order to validate the importance of the emotional component in the high stakes lies videos, research assistants independently coded the videotapes using the *Facial Action Coding System* (FACS; Ekman & Friesen, 1978) and were able to correctly classify 80 percent of the targets based on the presence or absence of micro-expressions of fear or disgust. These results show that the emotions present in the high stakes lies stimuli do provide accurate cues to deception.

In a further attempt to confirm that facial expressions of emotion are the key elements responsible for higher levels of deceit detection accuracy in the high stakes lies paradigm, the videos were broken down into three channels: a voice tone channel, a body channel, and a facial channel. Only the facial channel provided consistent accuracies of deceit detection across different situations (Frank & Ekman, 2004).

These studies show that prior laboratory experiments on deceit detection may not be generalizable to what happens in everyday life. Indeed, when the stimuli is created using a high stakes lies paradigm, judges show higher levels of average accuracy at detecting deceit than shown with the typical laboratory deceit studies.

2.2 Aging and Deceit Detection

For the most part, the ability to detect deceit has not been investigated from a developmental perspective. Based on the deception literature and findings from the sociocognitive aging literature, there is reason to believe that older adults may show even greater deficits in deceit detection than young adults. More specifically, the sociocognitive literature has shown that older adults have unique vulnerabilities to social judgment biases (Blanchard-Fields & Horhota, 2005). This literature is suggestive of the possibility that the mechanisms which underlie social judgment biases may be operating similarly in deceit detection situations.

A recent aging and deception study found that older adults were better able to detect deceit than young adults (Bond, Thompson, & Malloy, 2005). The authors suggest that because older adults have greater accumulated experience with detecting truth and deception, their reliance on heuristics based on this experience puts them at an advantage in detecting deceit, compared to young adults. The messages were presented in audio format only, however. While nonverbal information such as tone of voice and speech errors may have been clues to deception in the audio tapes, facial expressions of emotion were not presented. According to Frank and Ekman (1997, 2004), facial expressions of emotion provide leakage cues to deception. Liars betray their emotions of fear, guilt, and excitement in micro-expressions of emotion.

Two studies have examined lie detection ability across the lifespan using visual stimuli. Because these studies relied on samples of law enforcement personnel, they used a limited age range which only extends into late middle age. One study found an age-related decline in the ability to detect deceit (Ekman & O'Sullivan, 1991) in 10 videos of people lying or telling the truth about their feelings. Conversely, a positive correlation between age and detection ability for truthful reports was found when participants viewed videotapes of four different people lying or telling the truth about factual statements (Köhnken, 1987).

There are very few studies to date addressing the relationship between age and deceit detection. Those studies which have addressed this issue produced conflicting results. One possible explanation for these mixed results lies in the medium of presentation. Older adults may be just as good at detecting deceit with audio information only, but may be at a disadvantage when visual stimuli are provided. Another possible reason for the conflicting results in the literature is that none of these studies used a high stakes lies paradigm, so they may be less typical of lies in daily life.

A number of important implications for age and deception come from the mainstream literature on deception reviewed in the previous section. The evidence that implicit theories of lie detection are often inaccurate points to the possibility of an intervention. If people learned to recognize the valid cues of deception, they might be less likely to fall prey to scams. All people would benefit from an intervention such as this, but it may be particularly important to focus on teaching the elderly these strategies because they are so often the victims of financial fraud.

Research on the truth bias heuristic suggests that reduced cognitive capacity or motivation to use cognitive capacity, results in a tendency to judge more statements as truths than lies, leading to overall inaccurate deceit detection. Because older adults are shown to have fewer available cognitive resources than young adults (Salthouse, 1991), we might expect that older adults would rely on a cognitive heuristic such as the truth bias more frequently or to a greater extent, than young adults. This is one possible explanation for an age-related decrement in detecting deceit.

The mainstream deception literature has also identified suspicion as an important individual difference factor in deceit detection. Anecdotally, the cause of older adults' vulnerability to consumer fraud is often attributed to their more "trusting nature" in the media. Interestingly, older adults score lower than young adults on the GCS scale, indicating that they are less suspicious (Bond & Lee, 2005). In the present study, we will explore the influence of individual differences in trait suspicion on the detection of deceit.

Recent work on deception has shown the importance of emotion recognition in detecting deceit using the high stakes lie paradigm (Frank & Ekman, 1997, 2004). Interestingly, age-related changes in these factors may lead to even worse abilities to deceit detection in the elderly, which would have important implications for the lives of older adults. A decrement in the detection of deceit may render older adults even more vulnerable to con artists and wily politicians. The next section contains a review of the extant literature on aging and emotion, focusing on those emotional processes which degrade over the lifespan.

2.3 Aging and Emotion Recognition

In general, emotion is a domain where older adults' functioning is preserved. The aging literature often makes the important distinction between an age-related decline in cognitive abilities and the preservation of emotion regulation and control (Lawton, Kleban, Rajagopal, & Dean, 1992; Gross et al., 1997). Laura Carstensen's socioemotional selectivity theory accounts for these increases in emotion regulation as a shift from achievement-oriented goals to emotionally-relevant goals as time becomes constrained (Carstensen, Isaacowitz, & Charles, 1999). While there is a great deal of evidence that the experience and regulation of emotions improves with age, the story is not as promising for the recognition of emotions across the lifespan.

Socioemotional selectivity theory would predict that more attention would be paid to information relevant to emotional goals as we age. To test this hypothesis, pairs of faces were presented to younger and older participants (Mather & Carstensen, 2003). One of the faces in each pair was neutral while the other was either positive or negative. The speed with which young adults responded to the position of the dot-probe following the presentation of faces was consistent regardless of the face which preceded its position. Older adults were faster to respond to the dot-probe when it appeared behind the face in the pair that displayed the greatest level of positive emotions. This attentional bias supports the theory that older adults avoid negative information.

A number of other studies have shown a general age-related decline in the recognition of emotion. For example, compared to young and middle-aged adults, older decoders perform the most poorly in decoding facial expressions of emotion in videotapes (Malatesta, Izard, Culver, & Nicolich, 1987). In further support of this age-related deficit in emotion recognition, age was negatively correlated with a composite score for emotion recognition using stimuli displaying blends of emotional expressions (Heckman & Blanchard-Fields, 2004).

The aging and emotion literature has shown that older adults may possess a particular deficit for the recognition of certain emotions, not necessarily categorized by valence. In particular, there is some evidence that the recognition of anger, fear, and sadness show decline across the lifespan. The stimuli in these studies are photographs of young adults producing facial expressions of emotion. One study found that older adults are worse at recognizing sadness but better at identifying happiness, when compared to young adults (Moreno, Borod, Welkowitz, & Alpert, 1993). Other research has identified age-related impairments in recognizing anger and sadness, but not fear (Phillips, MacLean, & Allen, 2002).

Further research indicates that the distinction between those aspects of emotion recognition that are spared and those which are lost may not be as simple as a strict matter of emotional valence (i.e., positive or negative). The preservation of the ability to recognize positive emotions throughout the lifespan is consistent across studies. The negative emotional domain, however, shows preservation or improvement in the recognition of some emotions and decrements for others. For example, older adults were better at recognizing facial expressions of disgust than young adults in three experiments (Calder et al., 1993). This study also reported, however, a significant and progressive decrease in the recognition of fear and anger across the lifespan. Age-related decrements are found after controlling for individual differences in visual perception of faces, face processing, and fluid intelligence, indicating that it is face processing abilities tied to specific emotions which are affected by age, independent of many other age-related changes (Sullivan & Ruffman, 2004). The Sullivan and Ruffman study reported no decrements for the recognition of fear and happiness, which partially contradicts the age-related decrement for fear recognition found by Calder and colleagues. These conflicting results are difficult to integrate and may have arisen due to differences in methodology. For instance, the face stimuli used in these studies vary immensely. Some photographs of facial expressions are presented in black and white while others are in color, some are posed while others are spontaneous, and some are flashed briefly on the screen while others are self-paced. All of the studies, however, point to differential losses and gains of emotion recognition for particular emotions. Research in this field is in its infancy, but a review of the studies which have addressed aging and deficits of specific emotions reveals that there does not appear to be a global emotion recognition deficit related to aging but rather age-related deficits for certain emotions (see Table 1 for results of studies showing age differences for different emotions).

Table 1
Number of Studies to Find Age Differences in Facial Expressions of Emotion

Findings	Emotion				
	Fear	Anger	Disgust	Happy	Sad
OA = YA	1	---	1	2	---
OA < YA	3	5	---	1	7
OA > YA	---	---	2	1	---

These mixed results are difficult to interpret, but a differential decline of certain emotions, rather than a global decline, argues against a strict cognitive capacity explanation. The age-related decrement in the ability to detect emotions has been most strongly exhibited in the recognition of anger, not fear. Rather, it points to declines in specific subsystems tied to certain emotions. This possibility, however, needs to be empirically tested.

Putting it all together, an age-related decrement in the ability to detect certain emotions may have implications for the ability to detect deceit. Older adults have been shown to be worse at recognizing anger and fear, when compared to young adults (Calder et al., 1993). The ability to recognize micro-expressions of emotion is an important component of deceit detection (Frank & Ekman, 1997, 2004). Older adults may be impaired at detecting deceit in face-to-face situations because they are unable to recognize the emotional leakage cues which are valid cues to deceit.

CHAPTER 3

METHODOLOGY

3.1 Current Study

The goals of the current study were to 1) explore age-related differences in the detection of deceit; 2) explore the role of other individual difference variables in deceit detection across the lifespan (e.g., suspiciousness, interpersonal perception skills, and cognitive abilities); 3) explore age-related differences in deceit detection as a function of the presence of facial cues of emotion; and 4) examine the role of emotion recognition differences in explaining age-related differences in deceit detection.

This is the first study in a program of research investigating the vulnerability of older adults to deception. In this study, we focused on the ability to detect deceit that is relevant for face-to-face situations using a high stakes lies paradigm. Older adults may be vulnerable to particular types of deceit for various reasons. For example, in face-to-face situations older adults may be vulnerable due to a deficit in emotion recognition. When only audio cues are present, however, older adults may be vulnerable due to cognitive capacity deficits.

This study used an extreme-groups design with young and older adults only. Because there are so few studies on aging and deceit detection in the literature, an age-related difference must first be established before investigating the pattern across the lifespan. There were three conditions of stimuli presentation: (1) visual only, (2) audio only, and (3) audio-visual. These conditions were designed to help determine whether visual information is a critical dimension in accounting for differences in deceit detection.

This study has two main hypotheses.

Hypothesis 1: Young adults will outperform older adults in the two conditions with visual stimuli (the visual only and audio-visual conditions). We expected older adults to have a deficit in recognizing facial expressions of emotion rendering them at a greater disadvantage in detecting deceit when facial cues are present. When only audio cues are present, we did not expect older adults to be at a disadvantage compared to young adults and thus no age differences were expected in the audio only condition. Despite the fact that Bond and colleagues (2005) found an age-related increase in the ability to detect deceit using audio only, we do not expect to replicate these findings. The stimuli in the present study are markedly different from those used by Bond and colleagues in that we employed the high stakes lies paradigm. When emotional cues are present, even in the voice channel, accumulated experience may not make a difference in the detection of deceit. For this reason, we expected age differences only in those conditions which provide facial cues.

We also had several exploratory hypotheses regarding alternative predictors of deceit detection accuracy. We expected high suspiciousness to lead to a lie-bias. More specifically, individuals who score high in suspiciousness on the *Generalized Communicative Suspicion* scale should show a tendency to judge more statements as lies than truths. This tendency was expected to decrease deceit detection accuracy. Older adults score lower on suspiciousness than young adults (Bond & Lee, 2005), which may lead to age differences in this construct. We also expected individual differences in the

Interpersonal Perception Task-15 (Costanzo & Archer, 1993) to predict deceit detection accuracy. Individuals who are better at perceiving interpersonal relationships in social situations should also be better at person-perception judgments. We did not have specific hypotheses about the age effects of these exploratory variables.

Hypothesis 2: We expected that the relationship between age and deceit detection would be mediated by emotion recognition ability. Past research has shown that older adults are impaired in the ability to detect certain emotions (anger, sadness, and fear). In the high stakes lies paradigm, these expressions of emotion have been shown to be valid cues to deceit. For these reasons, we expected individual differences in the ability to recognize emotions in facial expressions to account for age differences in the ability to detect deceit.

3.2 Participants

3.2.1 Recruitment

Young adult participants were recruited from a pool of undergraduate psychology students and from the community. Each student received credit hours toward a course participation requirement and non-students received monetary remuneration ($30). Older adult participants were recruited from our older adult participant pool. Each older adult participant received monetary remuneration for participation ($30).

3.2.2 Exclusions

A total of 394 participants (184 young adults and 209 older adults) completed this study. Of these participants, 10 percent (n = 40) were excluded from data analyses. Participants were excluded for a variety of reasons. These reasons include participants who fell below cut-off criteria for the cognitive and perceptual ability measures, participants with missing data, participants who represented outliers, participants who were recruited differently, and participants who were not attentive during the experiment (see Table 2 for a breakdown of the participant exclusions).

More specifically, the exclusions are as follows: two older adult participants were excluded because they did not reach a minimum cut-off criterion of five correct on the *Advanced Vocabulary Test* (Ekstrom, French, Harman, & Derman, 1976). One young adult who scored zero correct on the working memory test was excluded because no other young adult scored this low. Two older adults whose visual acuity was worse than our cut-off criterion of 20/60 were excluded. Seven older adult participants were excluded because they were missing data on the deceit detection questionnaire. Two young adults and six older adults were missing data on the emotion recognition test due to either technical failures with the computer program or an inability to finish the test. Outliers in the emotion recognition test were determined as any score more than two standard deviations away from the mean of the sum of the number of negative emotions answered correctly, separately for young and older adults. This exclusion criteria resulted in six young adults and six older adults being excluded because they scored more than two standard deviations lower than the mean for young adults ($M = 65.68$, $SD = 7.29$) and older adults ($M = 54.85$, $SD = 12.21$), respectively. Six young adults, who were recruited through the community, rather than the university participant pool, were excluded because they consistently scored significantly lower than our university participant pool young adults on the cognitive tasks. Two young adult participants were excluded because they were laughing and roughhousing during the experiment. Thus, a total of 17 young adults and 23 older adults were excluded from the study. This leaves a total of 354 participants (167 young adults and 187 older adults).

Table 2
Participant Exclusions

Reason for Exclusion	Number of Participants Excluded		
	# YA	# OA	Total
Scored < 5 Correct on Vocabulary Test	0	2	2
Outlier for Age Group on Audio Computation-Span	1	0	1
Scored > 20/60 Visual Acuity	0	2	2
Missing Data on Deceit Detection Questionnaire	0	7	7
Missing Data on Emotion Recognition Test	2	6	8
Outlier for Age Group on Emotion Recognition Test	6	6	12
Different Recruitment Procedure	6	0	6
Not Attentive during Experiment	2	0	2
Total	17	23	40

3.2.3 Sample Characteristics

Of the 354 participants remaining after exclusions approximately 50 percent are women (Female n = 179; Male n = 175). There were approximately 55 young adults and 55 older adults in each condition (see Table 3 for a breakdown of the number of participants in each cell). Half of the participants were presented the crime topic interviews first and the opinion topic interviews (n = 177) and the other half were presented the opinion interviews first (n = 177).

Table 3
Number of Participants in Each Condition by Age Group

		Age Group		
		Young Adults	Older Adults	Total
Condition	Visual Only	55	60	115
	Audio Only	56	55	111
	Audio-Visual	56	72	128
	Total	167	187	354

On average, participants had more than 12 years of formal education (*M* = 14.30 years, *SD* = 2.02) with older adults reporting significantly more years of education (*M* = 14.74, *SE* = .14) than young adults (*M* = 13.80, *SE* = .15; $F(1, 352) = 20.15$, $p < .01$). The majority of participants were Caucasian (74%) or Black (12%). See Table 4 for a complete description of the race characteristics of this sample.

Table 4
Race Characteristics of Sample

Race	Frequency	Percent
Caucasian	261	74%
Black or African American	42	12%
Asian	27	8%
More than one race	11	3%
Other	6	2%
American Indian/Alaska Native	1	0%
Native Hawaiian or Other Pacific Islander	1	0%
Missing	5	1%
Total	354	100%

The participants in this sample exhibit the typical pattern of age differences in perceptual and cognitive abilities (Table 5). Specifically, young adults exhibited better visual acuity ($M = 17.98$, $SE = .57$) and facial discrimination skills ($M = 23.35$, $SE = .17$) when compared to older adults ($M = 26.28$, $SE = .54$; $M = 21.57$, $SE = .16$, respectively; $ps < .01$). The score for visual acuity was the bottom number of the *Snellen* fraction such that 20/20 would be good vision and higher denominators (e.g., 20/60) indicate worse visual acuity. Young adults also outperformed older adults on our measures of fluid intelligence ($M_{YA} = 24.41$, $SE_{YA} = .34$; $M_{OA} = 14.96$, $SE_{OA} = .32$, respectively) and working memory ($M_{YA} = 5.09$, $SE_{YA} = .10$; $M_{OA} = 2.02$, $SE_{OA} = .09$, respectively; $ps < .01$). Older adults, however, were significantly better than young adults on our measure of crystallized intelligence, the *Advanced Vocabulary Test* ($M_{OA} = 21.61$, $SE_{OA} = .42$; $M_{YA} = 19.04$, $SE_{YA} = .45$, respectively; $p < .01$).

Table 5
One-Way ANOVAs: Age-Related Differences in Perceptual and Cognitive Abilities

	YA		OA				
	Mean	*SE*	*Mean*	*SE*	*F*	*p*	η^2
Visual Acuity Snellen (Higher scores = worse visual acuity)	17.98	.57	26.28	.54	113.15	.00	.24
Facial Discrimination Benton (Maximum = 27)	23.35	.17	21.57	.16	55.97	.00	.14
Fluid Intelligence Letter Sets (Maximum = 30)	24.41	.34	14.96	.32	410.56	.00	.54
Working Memory Audio-Computation Test (Maximum = 7)	5.09	.10	2.02	.09	511.52	.00	.59
Crystallized Intelligence Vocabulary Test (Maximum = 36)	19.04	.45	21.61	.42	17.63	.00	.05

3.3 Materials

3.3.1 Demographics Form

Participants filled out a demographics form as required by the National Institute on Aging. This form included information about age, gender, ethnic background, and health. For health, participants were asked to rate their overall health on a 5-point Likert scale (1 = *poor,* 5 = *excellent*).

3.3.2 Perceptual Functioning

Participants were screened for vision using two tests. The first was a measure of visual acuity, using the *Snellen* chart (Snellen, 1862). This is the standard eye chart used by optometrists. Participant's score was the denominator in the fraction that represented the smallest line on the chart the participant could read with fewer than three mistakes (e.g., 20/40 would receive a score of 40).

We used a second test to determine whether participants could correctly discriminate between human faces because we thought this perceptual ability would be more closely related to the ability to decode facial expressions. Thus, for the second test of perceptual functioning, we administered the *Benton Facial Discrimination Test Short Form* (Levin, Hamsher, & Benton, 1975) which assesses the capacity to identify and discriminate photographs of unfamiliar human faces. On a sample-to-test reliability, the internal consistency of the new short form was *Cronbach's* $\alpha = .69$. This test is predictive of prosopagnosia, a specific deficit in facial recognition. In this task, participants were first presented with a target face on the first page. On the facing page, they had to identify the identical target face in an array of six faces. Photographs of male and female faces were used and were cropped closely so that only the face was visible. On subsequent trials, three of the six pictures matched the target face and the participant was asked to identify all three. There were 27 targets to match in total and participants' scores were the number of target faces identified correctly.

3.3.3 Cognitive Abilities

3.3.3.1 Vocabulary Test

The *Advanced Vocabulary Test* (Ekstrom et al., 1976) was used to measure verbal ability. For each of the 36 items, participants circled the word from a list of four words that is closest in meaning to a target vocabulary word. The difficulty of the vocabulary increases as the test progresses. The score is the number of correct responses.

3.3.3.2 Letter Sets Test

Fluid intelligence was measured using the Educational Testing Service *Letter Sets Test – I-1 (Rev.)* (Ekstrom et al., 1976). For each of the 30 items, participants were presented with five letter sets (e.g., ABCD, RSTU, OPMN, FGHI, WXYZ) and had to deduce the rule which four of the letter sets follow. They responded by circling the set of letters which do not follow the rule. In the example above, the rule is that four of the letter sets are in alphabetical order; the response would be to mark an "X" over OPMN, which violates this rule. The score is the number of correct responses.

3.3.3.3 Audio-Computation Span

Working memory capacity was assessed using the audio computation span task (Salthouse & Babcock, 1991). Participants heard a series of arithmetic problems that they were required to solve while at the same time remembering the second digit from each problem. The number of arithmetic problems presented in each set increased from one to seven with three trials at each set level. After completing the arithmetic for each trial, the participants were asked to recall the second digit from each problem presented. The task is scored based on the participant's ability to accurately perform the arithmetic problems and recall the second digit from each problem. Working memory span is designated as the highest number of digits recalled correctly on at least two of the three trials with that set length.

3.3.4 Deceit Detection

3.3.4.1 Deceit Detection Stimuli

The stimulus material for the deceit detection task was obtained from Frank and Ekman (1997, 2004). The material consists of two videos. Each video contains interviews with 10 different men, ages 18-28 years, from the San Francisco area. One video consists of a *crime interrogation* and the other is a *social opinion interrogation*. In both situations, a man is being interrogated by an interviewer. The interrogation is either on whether they stole money from a briefcase a few minutes prior to the interrogation or what their true opinion is on capital punishment or banning smoking. The men in each scene are different, but the interviewer is the same person in all scenes.

The six questions the interviewer asked during the crime interrogation are as follows: 1) *Describe exactly what happened, what you saw and did, when you were in that room*; 2) *Describe for me what your thoughts were when you entered that room*; 3) *Do you know how much money was--or was supposed to be--in the envelope*; 4) *Did you take the money from the envelope*; 5) *Did you bring the money with you into this room*; and 6) *Are you lying to me now?*

The six questions the interviewer asked each interviewee in the social opinion interrogation were as follows: 1) *What is your position on this current event issue*; 2) *Why is it that you believe what you do on this issue*; 3) *How long have you had this opinion*; 4) *Is this your true opinion*; 5) *You didn't just make up this opinion a few minutes ago*; and 6) *Are you lying to me now?*

Each interview is approximately one minute in length and shows the interviewed man in facial close-up with full audio. The interrogator can be heard, but not seen, asking questions. The duration of the crime topic video is approximately 12 minutes. The duration of the social opinion topic video is approximately 14 minutes.

3.3.4.2 Deceit Detection Questionnaire

To introduce the deceit detection task, participants were told that, *Anywhere from 1/4 to 3/4 of the people in these interviews are lying*. Prior to the presentation of the deceit detection interviews, participants rated how good they believe they are at knowing when someone else is lying on a 5-point Likert Scale (1 = *very poor*, 5 = *very good*). Both young and older adults reported being about average at knowing when someone is lying (M_{YA} = 3.29, SE_{YA} = .05; M_{OA} = 3.26, SE_{OA} = .05, respectively). There were no age differences in this judgment, $F < 1.0$. After each interrogation scene, there was a pause for participants to circle their judgment on the target person's truthfulness. For each scene, participants circled either the word *truthful* or *lying*. They also rated their confidence for each judgment (1 = *not at all certain*, 7 = *extremely certain*). There were no age differences in the average confident judgment for the crime topic interviews (M_{YA} = 4.20, SE_{YA} = .07; M_{OA} = 4.15, SE_{OA} = .07, respectively) or the opinion topic interviews (M_{YA} = 4.36, SE_{YA} = .07; M_{OA} = 4.30, SE_{OA} = .07, respectively), Fs < 1.0. Both young and older adults were significantly more confident, on average, for the opinion topic interviews than the crime topic interviews, young adults $t(161) = -3.25$, $p < .01$ and older adults $t(170) = -2.83$, $p < .01$.

The presentation of the crime topic interviews and the social opinion topic interviews was counterbalanced between participants. The videos were projected onto a large screen and all participants were equidistant from the screen. After each set of 10 scenes (crime or social opinion), participants rated on a 5-point Likert Scale how well they think they did at telling which people were lying (1 = *very poorly,* 5 = *very well*).

3.3.4.3 Deceit Detection Thought Listing

After the first 10 interviews, participants were asked to write down the factors that went into their judgment about the last interview presented (i.e., Number 10). After the second set of 10 interviews, participants were again asked to write down the factors that went into their judgment about only the last interview presented (i.e., Number 10 from second set).

After the deceit detection task was completed (i.e., all 20 interviews were presented), participants were asked to indicate the factors that went into their judgments of deception and truth-telling in an open format. Because we thought these factors might not be spontaneously provided, participants were also given a second page after completing this initial open thought listing task. On this second page, participants were probed with more specific questions regarding the factors they used when making their judgments, specifically related to the verbal, nonverbal, facial, and body cues they used in making their judgments.

3.3.4.3.1 Qualitative Coding of Thought Listing

A theory and data-driven qualitative coding scheme was developed for the thought listing responses. The coding scheme includes the following 23 categories: eye contact, eye movement, swallowing, touching face, gestures/hand movement, head movement, body movement, body language, appearance, laughter, nervousness, direction of gaze, speed of speech, facial expressions, smiling, manner, pauses, quantity of response, quality of argument, tone of voice, content, question or topic, and not codeable. For a complete description and examples of each category in this coding scheme refer to Table 6.

Table 6
Qualitative Coding Scheme

Category	Description	Example
Eye Contact	Any reference to the amount of, or presence of, eye contact.	*He maintained very direct eye contact with the detective.*
Eye Movement	Any reference to the type or amount of eye movement (e.g., shifty or a lot of eye movements including eyebrows).	*If eyes were shifty, especially looking left while answering question, then the person was lying.*
Swallowing	Any reference to swallowing.	*There was no nervous swallowing as in some of the other interviews.*
Touching Face	References to the amount or type of face touching.	*If someone made contact with their face then he was lying.*
Gestures/Hand Movement	Any reference to the amount or type of hand movement, general or specific.	*He appeared to be pointing at something.*
Head Movement	Any reference to head movement including amount or type of head movement (e.g., nodding).	*Shaking their head a lot.*
Body Movement	References to the amount or presence of body movement.	*Did not make continuous body movements like some of the other people.*
Body Language	References to the body that are not encompassed in *Body Movement* (e.g., posture, position) and any citations of the exact phrase "body language."	*Body language such as shifting weight I saw as lying.*
Appearance	Any reference to physical characteristics including (but not limited to) race, hair color, type of dress (including hats or glasses), and personal hygiene.	*People with glasses were harder to read.*
Laughter	Any reference to laughter.	*He also even seemed to laugh at one point.*
Nervousness	Any description of the suspect as behaving in a nervous, suspicious, or self-conscious manner (or the absence of).	*1. Did not look confident.* *2. Appeared relaxed.*

Table 6 (continued)

Category	Description	Example
Direction of Gaze	Any mention of where the person is looking.	*Was not always looking straight forward.*
Speed of Speech	Reference to speed of speaking (e.g., slow or fast).	*He seemed to speak quickly.*
Facial Expressions	Any mention of facial expressions of emotion.	*Very little face expressions.*
Smiling	Presence or absence of a smile.	*Him smiling looked like he was nervous by the interviewer's questioning.*
Manner	Reference to anything about the suspect's manner, demeanor, (e.g., friendly or unfriendly, or active)	*He was a little too cocky.*
Pauses	Reference to the length or frequency of pauses during the conversation (or lack of).	*Length of pause to answer question.*
Quantity of Response	Reference to the amount of speech the suspect provides (a lot or a little).	
Quality of Argument	Reference to the degree of elaboration, whether the arguments are convincing (or not), the clarity of the argument and/or the specificity of the arguments.	*1. The arguments were clearly presented.* *2. The suspect gave good, convincing arguments.*
Tone of Voice	Any reference to the tone, inflection, or how the suspect's voice sounded.	*Inflection of voice.*
Content	Any reference to the actual content of the suspect's responses.	*When the money wasn't there the subject said this to cover up that he had taken it.*
Question or Topic	Any reference to the topic or questions the interviewer asks.	*Seriousness of issue.*
Not Codeable	Any off-topic response that does not fit within any other category.	*When I was growing up, we taught our children the difference between right and wrong.*

Two coders independently coded 22 percent of the 2,262 responses as presence or absence for each category. Coders discussed discrepancies to reach an agreement. Interrater reliability was 78 percent agreement. The remainder of the responses were coded by a single coder. The frequencies of each category mentioned by age groups are represented as percentages (Table 7). The most frequently mentioned cues to deception reported by participants were nervousness (young = 73%, old = 50%) and manner (young = 52%, old = 52%).

Table 7
Frequency of Coding Categories Mentioned by Age Group

Category	Young Adults	Older Adults	Across Age
Nervousness	73%	50%	61%
Manner	52%	52%	52%
Pauses	56%	41%	48%
Quality of Argument	55%	38%	46%
Content	47%	45%	46%
Eye Contact	36%	36%	36%
Eye Movement	41%	31%	36%
Facial Expressions	29%	30%	30%
Tone of Voice	37%	24%	30%
Laughter	41%	16%	28%
Not Codeable	26%	27%	27%
Body Movement	26%	24%	25%
Direction of Gaze	29%	22%	25%
Smiling	23%	17%	20%
Gestures/Hand Movement	26%	13%	19%
Body Language	20%	18%	19%
Quantity of Response	20%	11%	15%
Head Movement	12%	16%	14%
Touching Face	15%	10%	12%
Appearance	13%	12%	12%
Speed of Speech	17%	8%	12%
Question or Topic	5%	10%	8%
Swallowing	3%	0%	2%

3.3.5 Interpersonal Perception Task

In order to determine whether individual differences in the ability to decode nonverbal information in general is related to the ability to detect deceit, a measure of interpersonal perception skills was used. *The Interpersonal Perception Task-15 (IPT-15)* (Costanzo & Archer, 1993) was designed to assess nonverbal communication and social perception skills. The videotape consists of 15 scenes, each 30-60 seconds in duration. Each scene can be categorized into one of five domains: intimacy, competition, deception, kinship, or status and there is always an objectively correct answer. For example, participants viewed a scene with two adults and one child interacting. Participants had to decide which adult is the child's parent. This would be an example of a kinship type of social judgment. And there is an objectively correct answer because one of the adults acting in the scene is the child's parent in real life.

3.3.6 Generalized Communicative Suspicion Scale

In order to determine whether dispositional differences in suspicion are related to the ability to detect deceit, we measured individual differences in suspiciousness. The *Generalized Communicative Suspicion* scale (Levine & McCornack, 1991) measures a predisposition toward viewing the communication behaviors of others as deceptive. Participants rate their degree of agreement with 14 items on a 7-point Likert Scale (1 = *strongly agree,* 7 = *strongly disagree*). This measure of suspiciousness includes items such as, *When I first meet someone, I assume that they are probably lying to me about some things*. On a reliability sample, the test had high internal consistency (*Cronbach's alpha* = .75) and has been shown to predict judgments of deception.

3.3.7 Emotion Recognition

In order to test whether emotion recognition abilities are related to the ability to detect deceit, participants were given a test on identifying emotions. The faces for the test of emotion recognition were obtained from the *Montreal Set of Facial Displays of Emotion* (MSFDE; Beaupré, Cheung, & Hess, 2000). The MSFDE consists of facial expressions of emotion by men and women of European and African descent. Each expression was created using a directed facial action task and all expressions were FACS coded to assure identical expressions across actors. The set contains expressions of anger, joy, shame, fear, and disgust. All expressions had been morphed into three different levels of intensity. For the current study, the photographs were displayed on a computer screen. The E-prime program was used to create the test. The order of faces was randomly presented to participants, each for 1500 milliseconds (1.5 seconds). Each emotion was presented a total of 24 times during the task (eight times at each of the three intensities). Participants then responded by identifying which emotion was displayed (number keys represented the five different emotions; 1 = *anger,* 2 = *joy,* 3 = *shame,* 4 = *fear,* and 5 = *disgust*).

3.4 Procedure

Participants were tested in groups of one to four. Only participants in the same age group were allowed in the same session (i.e., young adults were tested with other young adults and older adults were tested with other older adults). Participants first read through and filled out a consent form. Next, the experimenter conducted the visual acuity test for each participant individually (the *Snellen* vision chart). Participants then took the *Benton Facial Discrimination Test*. Next, the deceit detection interviews were presented, during which participants filled out the *Deceit Detection Questionnaire* and responded to the *Thought Listing* task. Participants then completed the *Audio-Computation Span* task. At this point, participants were approximately half-way through the study and were given a five minute break. When participants returned from the break, they were administered two more cognitive abilities measures: the *Vocabulary* and *Letter Sets* tests. Next, participants watched and answered questions on the *Interpersonal Perception Task-15*. After the *IPT-15*, participants sat at an individual work station to complete the *Emotion Recognition* task on the computer. Next, participants responded to the *Generalized Communicative Suspicion* scale, and completed the *Demographics Form*. Participants were debriefed and compensated for their time at the end of the study. The study session took approximately three hours to complete.

CHAPTER 4

RESULTS

First, we tested for age differences in the ability to detect deceit. Second, we tested the influence of our exploratory variables on deceit detection accuracy. Third, we examined the role of emotion recognition in the ability to detect deceit and tested the mediated model.

4.1 Deceit Detection Accuracy

4.1.1 Effect of Age

Recall that previous aging and deception research found that older women were the best at detecting deceit (Bond et al., 2005). Based on these previous results, we investigated whether there was an interaction of age with gender or a main effect of gender for deceit detection with our stimuli. The gender effects were tested by performing a two-way between-subjects univariate analysis of variance (ANOVA). Age, Gender, and the Age X Gender interaction term were included as between-subjects independent variables. This analysis was performed three times with different dependent variables: 1) deceit detection accuracy collapsed across topic, 2) deceit detection accuracy scores for the crime topic interviews, and 3) deceit detection accuracy scores for the opinion topic interviews.

The Age X Gender interaction did not reach significance for the total deceit detection accuracy score, nor for deceit detection accuracy scores separately by topic ($ps > .10$). Men and women perform equally well at detecting deceit across the two topics (crime and opinion) and separately for the two topics ($ps > .10$). Because there were no gender effects, gender is excluded from further analyses examining deceit detection accuracy scores.

Next, in order to test the full model, we conducted a 2(Age: young vs. old) X 3(Condition: visual, audio, audio-visual) X 2(Topic: crime vs. opinion) mixed-design ANOVA with age and condition as between-subjects variables and topic as a within-subject variable. There was a main effect of age with young adults ($M = 5.85$, $SE = .09$) performing better than older adults ($M = 5.50$, $SE = .08$) at detecting deceit ($F(1, 348) = 9.42$, $p < .01$, $d = .23$). (See Figure 1 for a graph of the age differences in deceit detection accuracy by topic).

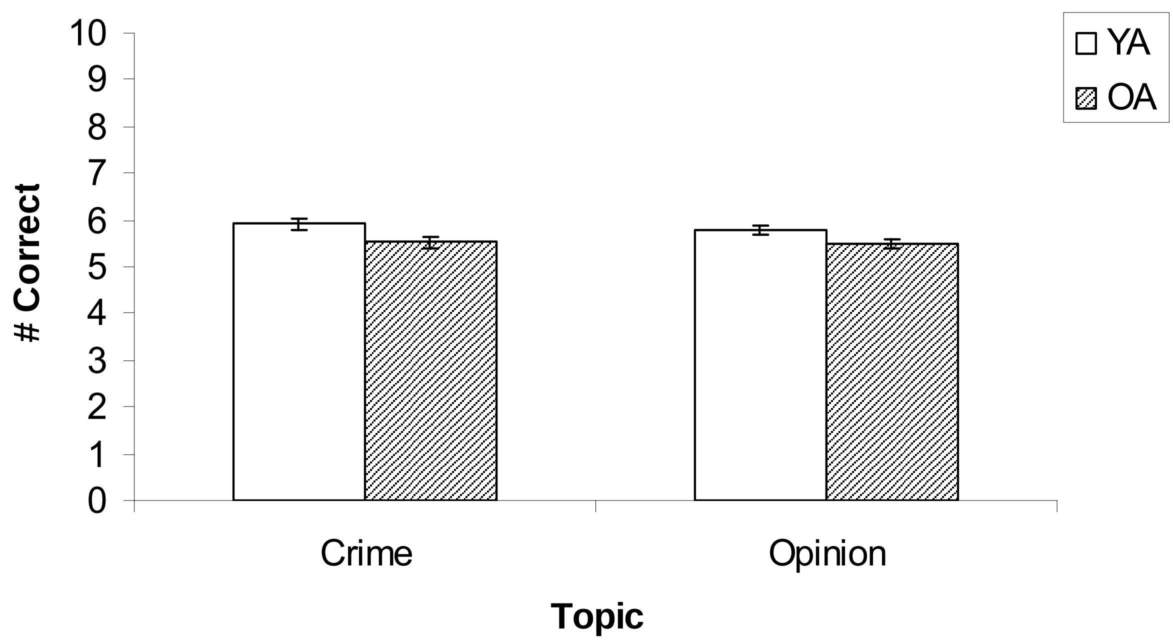

Figure 1
Age-Related Differences in Deceit Detection Accuracy by Topic

There was also a significant main effect of condition, $F(2, 348) = 5.56$, $p < .01$, $\eta^2 = .03$. There was no main effect of topic, $p > .10$, indicating that deceit detection accuracy does not differ depending on the topic.

These main effects, however, were qualified by a Topic X Condition interaction, $F(2, 348) = 13.17$, $p < .01$, $\eta 2 = .07$. Pairwise comparisons revealed that for the crime topic, all three conditions significantly differed from each other, with the audio-visual condition ($M = 6.30$, $SE = .14$) outperforming the audio condition ($M = 5.70$, $SE = .15$), which in turn was better than the visual condition ($M = 5.15$, $SE = .14$), $ps < .05$. For the opinion topic, none of the conditions differed from each other. None of the Age X Topic, the Age X Condition, nor the Age X Condition X Topic interactions reached significance, Fs < 1.0. The main finding of these results is that young adults are better at detecting deceit than older adults when deceit detection accuracy is collapsed across condition.

4.1.2 Effect of Condition: Medium of Presentation

Because we found a main effect of condition, we ran follow-up *t*-tests to determine which experimental conditions had an effect. This analysis was conducted three times with different dependent variables: 1) deceit detection accuracy scores collapsed across topic, 2) deceit detection accuracy scores for the crime topic only, and 3) deceit detection accuracy scores for the opinion topic only.

For deceit detection accuracy collapsed across topic, each condition's mean was compared to each other condition's mean using independent sample *t*-tests in order to determine which conditions differed from each other. The only significant difference found in these comparisons was between the deceit detection accuracy scores in the audio-visual condition and the visual only condition, $t(241) = -3.16$, $p < .01$, $d = .41$.

Specifically, participants in the audio-visual condition ($M = 11.77$, $SE = .18$) were better at detecting deceit than participants in the visual only condition ($M = 10.89$, $SE = .21$), when deceit detection accuracy scores are summed across topic.

The Condition X Age interaction term for the crime topic interviews did not reach significance, $p > .10$. There was, however, a main effect of condition for deceit detection in the crime topic interviews ($F(2, 348) = 17.15$, $p < .01$) with participants in the audio only condition ($M = 5.70$, $SE = .14$) and the audio-visual condition ($M = 6.27$, $SE = .13$) outperforming participants in the visual only condition ($M = 5.13$, $SE = .15$), *ps* < .01, d = .37 and .73, respectively. Also, participants in the audio-visual condition were better at detecting deceit than participants in the audio only condition, $t(237) = -2.90$, $p < .01$, $d = .38$. For the opinion topic interviews there was no interaction of condition with age, $p > .10$. There was also no effect of condition for deceit detection accuracy in the opinion topic interviews, $p > .10$.

4.1.3 Age-Related Differences by Condition

Although the Age X Condition interaction was not significant, we wanted to examine the age differences by condition because we hypothesized that the visual only condition would show greater age differences than the other two conditions. Thus, the simple effect of age was computed at each level of the three conditions separately by topic. For the crime topic deceit detection accuracy (Figure 2), only the visual only condition shows significant age-related differences ($F(1, 348) = 6.52$, $p < .05$) with young adults ($M = 5.51$, $SE = .21$) outperforming older adults ($M = 4.78$, $SE = .20$). For the opinion topic deceit detection accuracy (Figure 3), there were no significant age-related differences by condition (*p*s > .05).

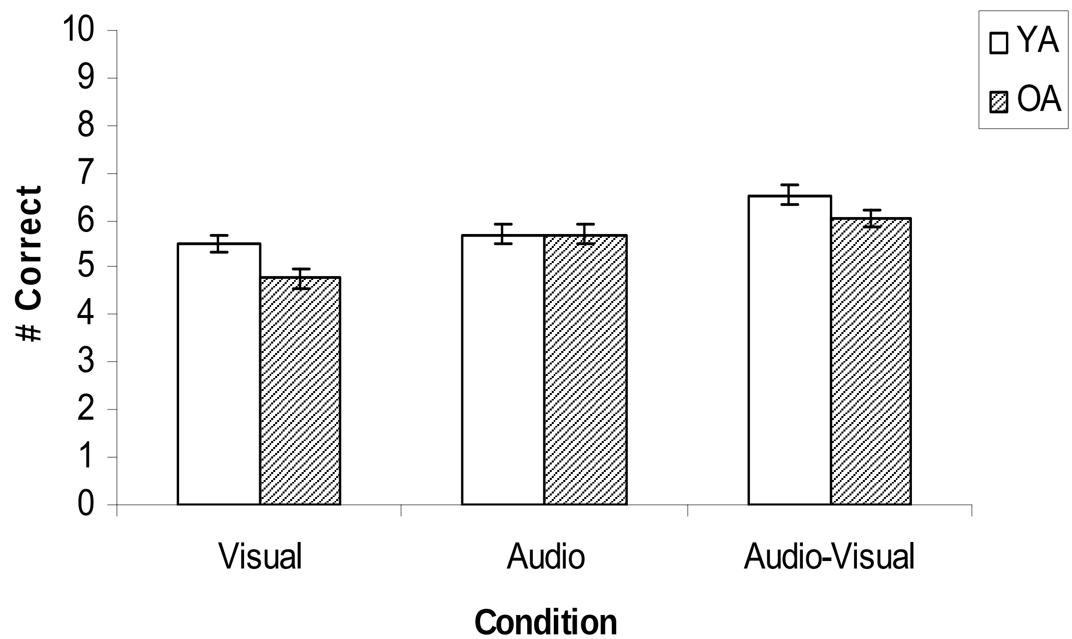

Figure 2
Age Differences in Crime Deceit Detection Accuracy by Condition

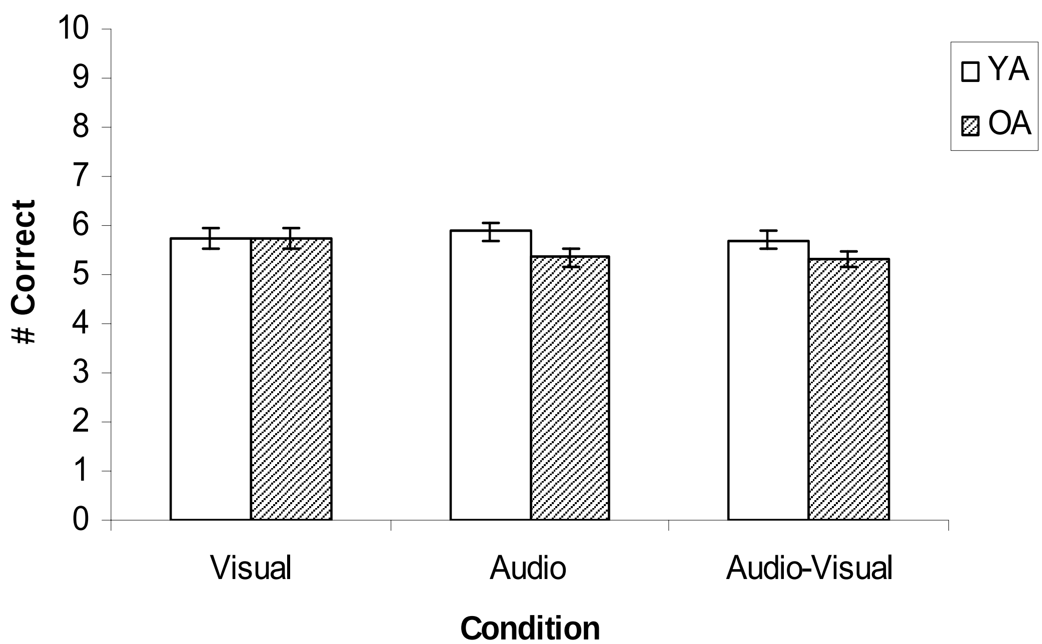

Figure 3
Age Differences in Opinion Deceit Detection Accuracy by Condition

4.1.4 Within-Age Condition Effects

For each of the two age groups, the mean of each condition was compared to the mean of each of the other conditions using independent sample *t*-tests.

4.1.4.1 Young Adults

For deceit detection accuracy collapsed across topic, the only significant condition differences for young adults was found when the audio-visual condition (M = 12.25, SE = .24) was compared to the visual only condition (M = 11.27, SE = .29). Specifically, young adults were better at detecting deceit in the audio-visual condition than the visual only condition, $t(109) = -2.60$, $p < .05$. For the crime deceit detection accuracy, young adults were significantly more accurate in the audio-visual condition (M = 6.54, SE = .19) than either the visual only (M = 5.51, SE = .20) or audio only (M = 5.70, SE = .20) conditions, $ps < .01$. For opinion deceit detection accuracy, there were no significant within-age condition effects for young adults.

4.1.4.2 Older Adults

Like young adults, older adults only showed a significant condition difference for deceit detection accuracy collapsed across topic when the audio-visual condition (M = 11.39, SE = .25) was compared to the visual only condition (M = 10.53, SE = .31). That is, older adults were significantly better at detecting deceit in the audio-visual condition when compared to the visual only condition, $t(130) = -2.17$, $p < .05$.

For the crime topic interviews, older adults were better in the two conditions with an audio component, the audio only condition (M = 5.71, SE = .20) and the audio-visual condition (M = 6.06, SE = .18), when compared to the visual only condition (M = 4.78, *SE* = .22), *ps* < .01. For the opinion deceit detection accuracy, there were no significant within-age condition effects.

4.1.5 Chance

Deception researchers often note that most people are not much better than chance at detecting deceit (see Anderson et al., 1997 for a review). In order to test whether deceit detection accuracy is different from chance in our study, one-sample *t*-tests were conducted comparing the deceit detection accuracy scores against the chance level scores collapsed across topic and for each topic separately. Because there are five lies and five truths in each topic set, the chance level for accuracy given a dichotomous truthful-lying decision is five for each topic separately. When the two topics are collapsed such that the total number correct out of 20 interviews is the dependent variable, the chance level of accuracy is 10.

Collapsing across topics, young adults, $t(166) = 10.39$, $p < .01$, and older adults, $t(186) = 6.36$, $p < .01$, were significantly better than chance in their deception accuracy. For the crime topic interviews, both young adults, $t(166) = 7.84$, $p < .01$, and older adults, $t(186) = 4.48$, $p < .01$, were again significantly better than chance at detecting deceit. Also in the opinion topic interviews, both young adults, $t(166) = 6.42$, $p < .01$, and older adults, $t(186) = 4.82$, $p < .01$, were significantly better than chance at detecting deceit.

It is important to note that older adults are not different from chance in the visual only condition when examining deceit detection accuracy collapsed across topic, $t(59) = 1.74$, $p > .05$. For the crime topic interviews, older adults are also not significantly different from chance for the visual only condition ($M = 4.78$, $SE = .22$), $p > .05$. Older adults are, however, significantly different from chance in all three conditions for opinion deceit detection accuracy, *ps* < .05.

4.1.6 Thought Listing

There were age differences in the frequency of each category mentioned for the following categories: gestures, laughter, nervousness, speed of speech, pauses, quantity of response, quality of response and tone of voice, *ps* < .05. For all of these age differences, young adults reported the category more frequently than older adults. These age differences in frequencies could be reflecting a tendency for young adults to emit more responses than older adults.

Interestingly, only deceit detection accuracy in the crime topic interviews is related to the thought listing responses. We were interested to see whether age differences in the factors used to make deception judgments would mediate the relationship between age and deceit detection. First, we examined the point-biserial correlations between the eight categories which showed age differences (listed above) and deceit detection accuracy in the crime topic interviews (see Table 8). Next, the two categories which showed a significant relationship with deceit detection, quality of argument and tone of voice, were tested as mediators using linear regression (Baron & Kenny, 1986). The use of quality of the argument as a cue to deception accounted for more of the variance in crime topic deceit detection accuracy than age when both variables were included in the model, $\beta = .24$, $SE = .17$, $p < .01$ and $\beta = -.08$, $SE = .09$, $p > .05$ for quality of argument and age group, respectively. That is, participants who reported using the quality of argument to make their veracity judgments were better at detecting deceit in the crime topic interviews, irrespective of age. Likewise, using tone of voice as a factor when making deception judgments accounted for more variance in crime deceit detection than age when both variables were input as predictors in the model, $\beta = .13$, $SE = .19$, $p < .05$ and $\beta = -.10$, $SE = .09$, $p > .05$ for tone of voice and age group, respectively. When these same analyses were conducted separately by the two conditions with age differences (visual and audio-visual), none of the category responses emerged as mediators, *ps* > .05 for category responses. This lack of significance could be due to lower statistical precision.

Table 8
Point-Biserial Correlations of Thought Listing Categories with Deceit Detection

		1	2	3	4	5	6	7	8	9	10
1	Age	1.00									
2	Deceit Crime	-.12*	1.00								
3	Gestures	-.17**	-.07	1.00							
4	Laughter	-.28**	-.01	.01	1.00						
5	Nervousness	-.25**	.01	.06	.10	1.00					
6	Speed of Speech	-.14**	.03	.01	.08	.04	1.00				
7	Pauses	-.15**	.04	-.02	.12*	.08	.18**	1.00			
8	Quantity	-.12*	.08	-.08	.06	.07	.11*	.08	1.00		
9	Quality	-.17**	.25**	-.19**	.06	.10	.14**	.32**	.17**	1.00	
10	Tone	-.14*	.14**	-.24**	.12*	.03	.17**	.29**	.08	.35**	1.00

* Correlation is significant at $p < .05$, two-tailed.
** Correlation is significant at $p < .01$, two-tailed.

4.2 Interim Summary of Results

The highlights of the results so far are that young adults are better than older adults at deceit detection accuracy collapsed across topic in the audio-visual condition. Young adults are also better than older adults at detecting deceit in the crime topic interviews in the visual only condition. Interestingly, a context-specificity by topic emerged, exhibited by the null finding of no age-related differences by condition for the opinion topic interviews. No age-related differences were found in the audio only condition for either topic. These findings suggest that without the audio component, older adults are at a disadvantage when compared to young adults. Finally, the thought listing results identify two categories of cues as predictors of crime topic deceit detection accuracy over and above age: quality of argument and tone of voice.

4.3 Individual Difference Measures

Several individual difference measures were included in the study as possible alternative mediators of the relationship between age and deceit detection. For each of these measures a one-way ANOVA was conducted with age as the independent variable and the score on the individual difference measure as the dependent variable. Next, the relationship between the individual difference measure and deceit detection was examined by computing *Pearson's* correlation coefficient (see Table 9). If this correlation was significant, we tested the mediated model to determine if the individual differences could account for age differences in deceit detection.

4.3.1 Suspiciousness

Replicating past findings, young adults (M = 52.54, SE = .79), were more suspicious than older adults (M = 47.06, SE = .74), $F(1, 352) = 25.70$, $p < .01$. No relationship between suspiciousness and deceit detection (collapsed across topic or separately by topic) was found, *ps* > .05.

4.3.2 Interpersonal Perception Task

Young adults (*M* = 10.35, *SE* =.14), outperformed older adults (*M* = 8.81, *SE* = .13) on the *Interpersonal Perception Task*, $F(1, 352) = 64.49$, $p < .01$. No relationship between interpersonal perception and deceit detection (collapsed across topic, crime, or opinion) was found, *ps* > .05.

4.3.3 Working Memory

As reported above, and consistent with the aging literature, young adults (*M* = 5.09, *SE* = .10), scored better on our measure of working memory than older adults (*M* = 2.02, *SE* = .09), $F(1, 352) = 511.52$, $p < .01$. Scores on the *Audio-Computation Span Task* are positively related with deceit detection accuracy collapsed across topic, $r = .16$, and deceit detection in the crime topic interviews, $r = .13$ ($p < .01$ and $p < .05$, respectively). That is, participants who scored better on our measure of working memory were better at detecting deceit. Because a relationship was found between working memory and deceit detection, the mediated model was tested using simultaneous linear regression to determine whether individual differences in working memory account for the age differences in deceit detection (Baron & Kenny, 1986). The mediated model was not supported.

Table 9
Pearson Correlation Coefficients for Individual Difference Measures and Deceit Detection (*N* = 354)

		1	2	3	4	5	6	7
1	Age	1.00						
2	Total Deceit	-0.16**	1.00					
3	Deceit Crime	-0.12*	0.74**	1.00				
4	Deceit Opinion	-0.11*	0.68**	0.01	1.00			
5	Suspiciousness	-0.26**	0.03	0.00	0.04	1.00		
6	Interpersonal Perception	-0.39**	0.10	0.09	0.04	0.12*	1.00	
7	Working Memory	-0.77**	0.16**	0.13*	0.10	0.16**	.33**	1.00

* Correlation is significant at $p < .05$, two-tailed.
** Correlation is significant at $p < .01$, two-tailed.

4.4 Emotion Recognition as Mediator

Recall that the emotion recognition measure included three intensities (low, medium, and high) of five different emotions (anger, joy, shame, fear, and disgust). After examining the data, we noticed that low and high intensities were showing little variability, perhaps due to floor and ceiling effects. Thus, only the medium intensities of the emotions measure are included in these analyses. This measure of medium intensity emotions showed good reliability, *Cronbach's* $\alpha = .81$.

First, an Age X Gender ANOVA was conducted with emotion recognition as the dependent variable. The interaction was not significant, $p > .05$. There is, however, a main effect of age for emotion recognition with young adults ($M = 34.89$, $SE = .37$) outperforming older adults ($M = 29.26$, $SE = .35$), $F(1, 352) = 125.10$, $p < .01$. There is also a main effect of gender, with women ($M = 32.74$, $SE = .41$) outperforming men ($M = 31.07$, $SE = .41$), $F(1, 352) = 8.33$, $p < .01$. Specifically, women were better than men at recognizing fear and disgust, *ps* $< .05$.

To test whether individual differences in emotion recognition abilities account for the age differences in deceit detection, the crime topic interviews in the visual only condition was used as the dependent variable. The crime topic was chosen because the opinion topic interviews did not show an effect of condition or any age differences in deceit detection by condition analyses. The visual only condition was chosen because this is the condition where a deficit in emotion recognition would put older adults at the greatest disadvantage when compared to young adults. Fear and shame have been identified in the deception literature as two emotions which are present during deception (Frank & Ekman, 1997). For this reason, a new emotion recognition variable was created for the mediated model by combining the fear and shame emotions. Using the Baron and Kenny (1986) steps for mediation, support was found for a fully mediated model. First, age is negatively associated with crime deceit detection in the visual only condition, $r = -.23$, $p < .05$. Age is also negatively associated with emotion recognition (fear and shame), $r = -.54$, $p < .01$. When age and emotion recognition are added to a linear regression model as predictors of crime deceit detection, emotion recognition is positively associated with deceit detection, $\beta = .53$, $p < .05$. Also, in this same hierarchical regression analysis, age is no longer a significant predictor of crime deceit detection, $p > .05$. In sum, the age-related differences in crime deceit detection can be accounted for by individual differences in emotion recognition such that participants who were better at recognizing fear and shame were better at crime topic deceit detection in the visual only condition.

When cognitive abilities were added to these analyses, it did not change the model. Also, when the two measures of perceptual abilities were added to the model, the relationship between emotion recognition and deceit detection remained significant. That is, emotion recognition abilities still account for the variance in deceit detection when crime deceit detection accuracy is simultaneously regressed on emotion recognition abilities and cognitive and perceptual abilities in the visual only condition. (See Table 10 for *Pearson's* correlation coefficients of emotion recognition with cognitive and perceptual abilities for the visual only condition).

Table 10
Pearson Correlation Coefficients for Emotion Recognition, Cognitive Abilities, and Perceptual Abilities in the Visual Only Condition (*N* = 115)

		1	2	3	4	5	6	7
1	Age	1.00						
2	Emotion Recognition	-0.54**	1.00					
3	Vocabulary	0.22*	0.09	1.00				
4	Letter Sets	-0.74**	0.52**	0.21*	1.00			
5	Working Memory	-0.78**	0.48**	0.04	.77**	1.00		
6	Snellen Visual Acuity	.55**	-.33**	.22*	-.38**	-.39**	1.00	
7	Benton Facial Discrimination	-.50**	.32**	.13	.45**	.40**	-.25**	1.00

* Correlation is significant at $p < .05$, two-tailed.
** Correlation is significant at $p < .01$, two-tailed.

4.5 Response Tendencies

Emotion recognition abilities do not account for the age differences in deceit detection for the opinion topic interviews. Instead, we tested the possibility that a truth bias was driving these age differences. That is, there might be differences in the response tendencies of young and older adults which can help explain age differences in deceit detection. To examine this possibility we used *Signal Detection Theory* (SDT; first applied to problems in sensory psychophysics by Tanner and Swets, 1954). Signal detection theory was developed as a method to measure a participant's ability to detect sensory stimuli. In particular, the method provides two different gauges of the participant's behavior: the participant's sensory sensitivity (*d'*) and response bias (β or *c*). We were interested in differences in response bias. The advantage of using SDT to explore the response tendencies of young and older adults is that it will provide a single statistic of bias that can be tested for age differences. If we were limited to using *t*-tests, we would need to conduct multiple *t*-tests to exhibit this same effect.

All of the SDT analyses were done separately for the crime and opinion topic interviews. First, the deceit detection accuracy scores were transformed into proportions of hit and false alarm rates. A hit is defined as a participant's response being "truth" when the target actually was telling the truth. A false alarm is defined as any time the participant said "truth" when the correct answer was lie (see Figure 5).

		Correct Answer	
		Truth	Lie
Decision	Say "Truth"	*Hit*	*False Alarm*
	Say "Lie"	*Miss*	*Correct Rejection*

Figure 4
Signal Detection Theory Operational Definitions

For example, if a participant got three of the possible five truths correct in the opinion topic interviews, the participant's hit rate would be 3/5 (.60). Furthermore, if the participant identified two of the five possible lies as truths, the participant's false alarm rate would be 2/5 (.40). These proportions were then transformed into *z* scores by subtracting the mean from each score and dividing by the standard deviation. Response bias was computed using the following formula (MacMillan & Creelman, 1990):

$$c = -.5[z(H) + z(F)]$$

where $z(H)$ is the z score of hits and $z(F)$ is the z score of false alarms. A participant would be truth-biased if they had both high hits and high false alarms. Because the formula multiplies this positive number by -.5, a participant who is truth-biased would have a negative c value. Thus, interpretation is as follows: a response bias of zero would indicate no bias, a negative response bias would indicate a truth bias, and a positive response bias would indicate a lie-bias. Sensitivity, or d', was also computed to determine whether differences in hit rates are an artifact of bias alone or whether there are also age differences in sensitivity. The d' statistic was computed using the following formula:

$$d' = z\text{ (H)} - z\text{ (FA)}$$

The c and d' statistics for each topic are shown in Table 11.

Table 11
Signal Detection Statistics by Age Group for Each Topic

	Sensitivity (d')				Bias (c)			
	Young		Old		Young		Old	
	Mean	*SE*	*Mean*	*SE*	*Mean*	*SE*	*Mean*	*SE*
Crime Topic	.22	.12	-.14	.11	.04	.05	-.02	.05
Opinion Topic	.17	.11	-.07	.10	.18	.05	-.12	.05

For the crime topic interviews, a one-way ANOVA was conducted with age as the independent variable and response bias (*c*) as the dependent variable. The results were not significant, $F(1, 352) < 1$. Although the results are not significant, it is interesting to note that the older adult group's mean was negative ($M = -.02$, $SE = .05$) while the young adult mean was positive ($M = .04$, $SE = .05$), indicating a trend in the truth-biased and lie-biased directions, respectively. To determine whether there are age differences in sensitivity for the crime topic interviews, a one-way ANOVA was conducted with age as the independent variable and sensitivity (d') as the dependent variable. For the crime topic interviews, young adults ($M = .22$, $SE = .12$) showed greater sensitivity than older adults ($M = -.14$, $SE = .11$), $F = 4.83$, $p < .05$, $d = .23$.

In order to determine whether there are age differences in response bias for the opinion topic interviews, a one-way ANOVA was conducted with age as the independent variable and response bias (*c*) as the dependent variable. Older adults are more truth-biased ($M = -.12$, $SE = .05$) than young adults ($M = .18$, $SE = .05$) in the opinion topic interviews, $F(1, 352) = 16.75$, $p < .01$ (see Figure 6). In order to determine whether there are age differences in sensitivity for the opinion topic interviews, we conducted a one-way ANOVA with age as the independent variable and sensitivity for the opinion topic interviews (d') as the dependent variable. The age differences in sensitivity for the opinion topic interviews were not significant, $F < 1.0$, indicating that age differences in hit rates for the opinion topic interviews are an artifact of bias alone. The mediated model was tested to see whether truth bias accounts for the age differences in opinion topic deceit detection but this model was not supported.

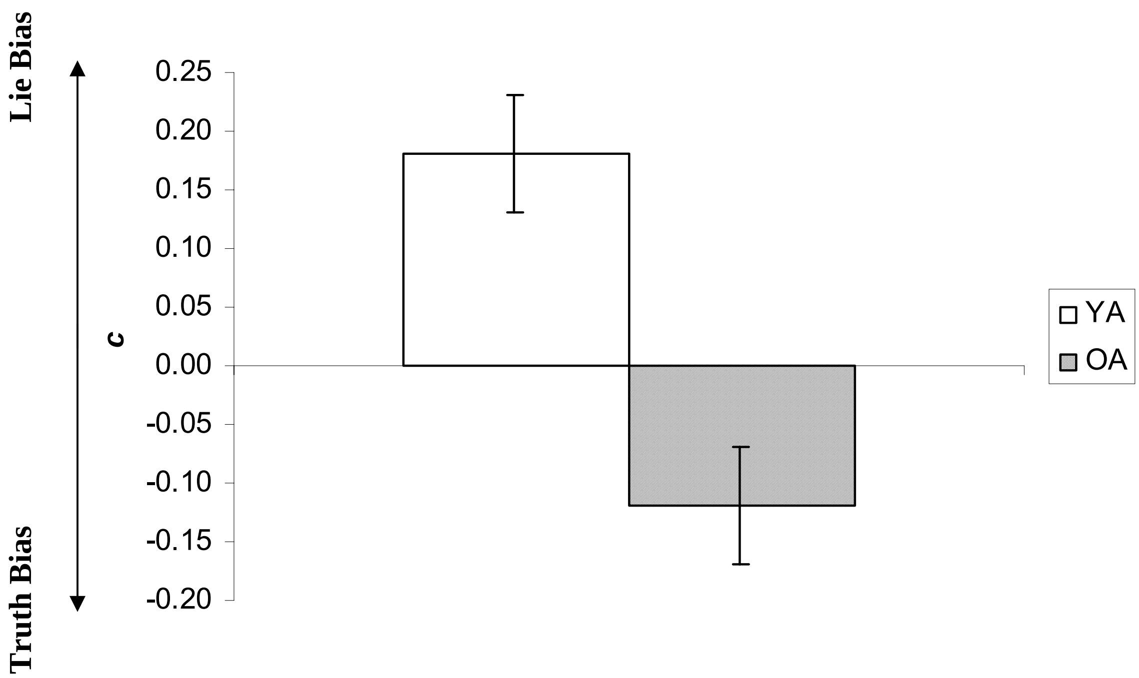

Figure 5
Age Differences in Response Bias in the Opinion Topic Interviews

CHAPTER 5

DISCUSSION

Age-related differences in deceit detection were explained by impaired emotion recognition abilities and heuristics such as response tendencies differentially for the two interview topics (crime and opinion, respectively). Specifically, in the crime topic interviews, we found that older adults do not benefit from visual information as much as young adults, whereas in the opinion topic interviews we found that a truth bias was related to deceit detection accuracy. Although our individual difference measures of interpersonal perception, trait suspiciousness, and cognitive abilities did show age differences, they did not help explain age differences in deceit detection.

In an exploratory fashion, we tested whether differences in response tendencies were related to differences in deceit detection. That is, in an ambiguous situation, participants might rely on a cognitive heuristic, or a rule of thumb, to make their veracity judgments. For example, participants might be inclined to respond “truth” as a default when they are unsure. This response bias could lead to poor deceit detection accuracy. Using signal detection theory, we were able to test this possibility in the crime and opinion topic interviews.

Interestingly, we found that older adults are truth biased, but only in the opinion topic interviews. The pattern of response bias means for the two age groups in the crime topic interviews was similar to that in the opinion topic interviews, exhibiting a trend in the same direction. These results suggest that older adults are more likely than young adults to rely on a cognitive heuristic such as the truth bias. Although in the crime topic interviews we saw that young adults were more sensitive to detecting "hits" than older adults, we did not find this age difference for the opinion topic interviews. The response biases in the opinion topic interviews, in conjunction with the lack of age differences in sensitivity, suggest that age differences in deceit detection accuracy for the opinion topic interviews are an artifact of the older adults' tendency to respond "truth". Again, we found that cognitive abilities do not account for this finding. Thus, perhaps the application of the truth bias is more motivational in nature than purely resource-dependent. This possibility is further exemplified by the differential relationships found between response bias and deceit detection by topic (i.e., no relationship found for crime topics, but a truth bias found for older adults in the opinion topic interviews).

As always, many new empirical and theoretical questions have arisen in response to the results of this study. First, emotion recognition emerged as an important predictor of deceit detection but as a separate process from other cognitive abilities. Second, this study specifically implicates the recognition of fear and shame as important for detecting deceit, while the deception research also includes disgust as important. Third, we find differential effects depending on the topic of the interviews (crime or opinion). The fourth point is more a methodological note on the advantages of signal detection theory for aging and deception research. These four aspects will be discussed in turn.

5.1 Emotion Recognition: Influence on Deceit Detection Beyond Cognitive Abilities

Replicating past work in the aging literature (Malatesta et al., 1987), we found that older adults were worse at decoding facial expressions of emotion when compared to young adults. For the crime topic interviews, in the visual only condition, individual differences in the ability to recognize fear and shame accounted for more of the variance in deceit detection accuracy than age. These results align with previous research in the deception literature which highlights the ability to recognize facial expressions of emotion as a critical component for accurate veracity judgments (Frank & Ekman, 1997, 2004).

This finding, together with the null results from testing other individual difference measures as mediators, indicates that there is something specifically important about emotion recognition for detecting deceit. We did find age-related differences in working memory capacity, for example, but these age differences did not account for the age differences in deceit detection. We found this same pattern of age differences but no support for mediation with our measure of fluid intelligence. Thus, age differences in crime topic deceit detection may not be due to speed of processing differences or differences in the ability to manipulate information.

The question remains as to what process is specific to emotion recognition abilities that is not tapped by our measures of working memory and fluid intelligence. One possible explanation for a process important for emotion recognition but not encompassed by working memory or fluid intelligence is the possibility that differences in perceptual abilities led to differences in emotion recognition performance. We did try to rule out this possibility by including two measures of visual functioning which did not account for the mediating effect of emotion recognition. Perhaps, however, a more fine-tuned measure of visual functioning is needed to capture the perceptual properties vital for emotion recognition.

One possibility for the age-related differences in emotion recognition that are not captured by fluid measures might be a social factor. The typical assumption is that with age comes greater experience. There may be some emotions, however, which are not as prevalently experienced in older adulthood as they are during young adulthood. Older adults may not be used to experiencing and interpreting those emotions which they were worse at identifying in this study such as anger, shame, and fear.

One limitation of this research is the generalizability of our interviews to real-world emotion recognition. If our emotion recognition measure was dynamic instead of static it might better represent processes operating in the context of perceiving emotions in action. Like the deceit detection interviews in this study, lies in the real world occur in dynamic formats; our measure of emotion recognition was static faces on a computer screen. A measure of dynamic emotion recognition abilities might help to further explain age-related differences in crime topic deceit detection as well as relate differentially to cognitive abilities. For example, we might expect a dynamic measure of emotion recognition to capture both processing speed and emotion recognition differences.

5.2 Fear and Shame: Cues to Deception

In this study, we found that the ability to recognize fear and shame were related to deceit detection in the visual condition for the crime topic interviews. These findings are consistent with past research; but the deception literature has also identified disgust as an important emotional cue to deceit (Frank & Ekman, 1997). We did not find support in our study for disgust being important for deceit detection.

First, we need to acknowledge methodological differences in our emotion recognition measures in comparison to those previously used. Frank and Ekman (1997) used a microexpression test of emotion recognition during which the faces were flashed on the screen for 1/25 second. Because we did not want age-related slowing in processing speed to influence our emotion recognition measure, we presented each face for 1.5 seconds. Replicating past work, however, we did find that fear and shame related to deceit detection. Thus, this methodological artifact does not tell the whole story.

The research which identified disgust as a valid cue to deception was based on trained FACS coders classifying facial expressions of emotion in the crime and opinion topic interviews (Frank & Ekman, 1997). The results from these analyses showed that fear and disgust were the best emotional cues to deception. Unfortunately, the authors did not break down their overall behavioral measure of emotion recognition to identify which emotions best correlated with deceit detection. The present study was able to identify the specific emotions which predicted better deceit detection in the visual only condition of the crime topic interviews. Our population differences accentuated this point: the emotions that older adults were poorer at recognizing were those emotions that were important for detecting deception. This discrepancy suggests that there is a disconnect between the facial expressions of emotions which leak out during lies and the emotional cues observers pick up on in these same stimuli.

5.3 Differential Topic Effects

Why did we find evidence for a truth bias in older adults for the opinion topic interviews but not in the crime topic interviews? Why did we find age-related differences by condition for the crime topic interviews but not the opinion topic interviews? We can only speculate as to why this context specificity by topic exists. There are several possible explanations which future research might address more directly.

One explanation for these differential topic effects is a difference in the severity of the transgression for each topic. The crime topic interviews deal with a moral issue: a theft. Thus, older adults may feel much more strongly about their veracity judgments, in comparison to the opinion topic interviews, and thus feel more comfortable using the available information to form a judgment, rather than relying on a heuristic. Conversely, in the social opinion topic interviews, older adults are not dealing with a hot moral issue like a crime. Instead, they may wonder why anyone would lie about their social opinion and be more likely to trust social opinion interviewees as truthtellers.

Research from the social cognition and aging literature can extend the interpretation of these findings. In ambiguous situations, older adults have been shown to rely on a dispositional bias more so than young adults, but once plausible explanations for behavior are provided, older adults no longer exhibit this bias (Blanchard-Fields & Horhota, 2005). Moreover, personal beliefs have been shown to guide older adults' social judgments more so than young adults (Horhota & Blanchard-Fields, in press).

A second explanation for these differential topic effects may be inherent in the stimuli themselves: the actual targets may “leak” more emotional cues when being questioned in the crime topic interviews than in the opinion topic interviews due to the nature of the situation.

5.4 Signal Detection Theory as a Method

The use of signal detection theory to analyze response tendencies allowed us to tease apart the response biases for young and older adults. This method gave us a more sensitive measure of deceit detection by allowing us to compare truth accuracy and lie accuracy rather than only assessing overall accuracy. Signal detection theory might be especially relevant for aging studies of deception because the truth and lie accuracies show a different pattern for young and older adults. Moreover, the lie-bias measured using signal detection theory could be thought of as state suspiciousness. In future research, examining lie-bias using signal detection theory might be a better way to explore the relationship between suspiciousness and deceit detection than the *Generalized Communicative Suspicion* scale which measures trait suspiciousness. Additionally, future studies might want to include a measure of trust, rather than suspiciousness, because trust is another dimension which might be more related to deceit detection than trait suspiciousness.

5.5 Concluding Comments

The complexity of the results section illustrates an overarching theme to emerge from this study: deceit detection abilities are multiply determined. That is, emotion recognition, perceptual abilities, working memory capacity, implicit theories of lie detection, response biases, and motivation all play a role in determining whether an individual can catch a liar.

Despite the evidence of an age-related decline in deceit detection, this study carries a hopeful message. Older adults only exhibited a disadvantage compared to young adults in certain contexts: the visual only condition and the crime topic. One aspect of the older adult's vulnerability to frauds and scams may be a deficit in emotion recognition, but this study shows that there is a way for older adults to compensate for this loss. For example, older adults might protect themselves by avoiding making financial decisions at initial face-to-face meetings.

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