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Applying the asymmetric information management (AIM) technique to virtual interviewing

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Abstract

The asymmetric information management (AIM) technique enhances verbal lie-detection by encouraging truth tellers (but not liars) to be forthcoming with information. We examined the AIM technique's utility for correctly distinguishing genuine and fabricated statements reported during a virtual interview. Truth tellers ($n = 85$) honestly reported their recollection of a 30-minute walk. Liars pretended to have engaged in a similar activity ($n = 86$). Participants were randomly assigned to either the AIM or Control condition and provided either a verbal or written statement. Truth tellers in the AIM condition reported more detailed statements (vs. the Control condition). Liars in the AIM condition reported less detailed statements (vs. the Control condition). More genuine and fabricated statements were correctly classified in the AIM condition (72% accuracy) compared to the Control condition (59% accuracy). No differences between disclosure type emerged. Results support the use of the AIM technique for facilitating verbal lie-detection.

KEYWORDS
AIM technique, information elicitation, lie-detection

The core objective of investigative interviewing is to obtain as much information from an interviewee as possible (Bull, 2010; Fisher, 2010). According to media richness theory (MRT) the richest mode of communication is via face-to-face interactions (Daft et al., 1987; Daft & Lengel, 1986). This is because face-to-face communication allows for instant mutual feedback, the transmission of verbal and nonverbal cues, and the availability of natural language and emotion. Due to the coronavirus pandemic, direct "face-to-face" interviewing of suspects and witnesses was considered potentially hazardous. This posed a problem as interviewing is a core function of police investigations. As such, the Joint Interim Interview Protocol (JIIP) was created. A collaboration between Police, CPS and lawyers, the JIIP was intended to assist investigators and prosecutors in judging whether suspects should (or should not) be interviewed as part of a police investigation during the Covid-19 pandemic (Crown Prosecution Service, 2021).

The JIIP protocol is regularly reviewed (most recently October 2021) and remains in place for all adult detainees, but no longer applies to suspects who are under 18 or adults who are vulnerable as defined in PACE Code C Paragraph 1.12(d) and 1.4. The guidance states that, in the context of the pandemic, remote virtual interviews (by video and audio link) are (under some conditions) permittable. This means that remote interviews are considered a reasonable and proportionate option to be made available to an adult suspect (with no vulnerabilities) who has the benefit of legal advice and who, having been fully informed and advised, consents to a remote interview.

Unfortunately, investigative interviewing and lie-detection research typically focuses upon direct face-to-face contexts. As such

there is limited research examining investigative interviewing tools online. One study indicates that eyewitness testimony appears more detailed when spoken accounts are recorded rather than written ones (Sauerland & Sporer, 2011). This is logical given that the communication research specifies that online interactions are not as rich as face-to-face communication (Daft et al., 1987; Daft & Lengel, 1986; Tung & Turban, 1998). Some research also suggests that lying may actually be easier within computer-mediated paradigms (Carlson et al., 2004).

One issue with the above research is that it was conducted through comparisons between direct face to face interviews and "poorer" methods of communication such as email, online chat, text and telephone. Perhaps advances in the ubiquity and quality of video-calling platforms such as Zoom, Teams and Skype mean that remote/online options produce fewer differences when compared to direct interviews. Research in healthcare and therapeutic interviewing suggests there may be fewer differences between remote/computer assisted interviewing and face to face contexts than Media Richness Theory would suggest. For example, Pickard and Roster (2020) found no noticeable disadvantages to disclosing sensitive information when the remote interview was computer assisted compared to human. However, a recent article by Bailenson (2021) suggests several ways in which such technology may be more cognitively depleting; including exposure to close-level eye-contact, difficulties with establishing conversational synchrony, reduced mobility which increases the focus on the verbal channel, and the presence of a "self-image" in the corner of the screen. Therefore, although virtual interviewing is a richer domain than those previously examined in online communication, it remains unclear how virtual interviewing will specifically impact verbal interviewing protocols. Specifically, it is plausible that virtual interviewing will reduce information elicitation, which in turn will reduce lie-detection accuracy. Accordingly, based upon the increased use of remote interviewing coupled with the uncertainty regarding future pandemics, research investigating effective virtual interviewing and remote lie-detection techniques is urgently required.

1 | RAPPORT BUILDING IN VIRTUAL INTERVIEWS

Within the scientific literature, rapport building is regarded as one of the most critical components of successful interviewing protocols and is designed for in-person interviews. Developing and maintaining rapport encourages suspects to talk more freely (Colwell et al., 2002; Griffiths & Milne, 2005; Walsh & Bull, 2010), and can lead to quicker resolution. Holmberg and Christianson (2002) found that many convicted offenders confessed to wrongdoing when they perceived their interviews had been conducted by interviewers offering an empathic and humanitarian stance. Rapport building can also be used to help witnesses to feel more relaxed during an interview, leading to increased co-operation and greater effort trying to recall information (Geiselman, 1984). The effects of rapport building on eyewitness memory have found that rapport can even enhance recall accuracy (Collins et al., 2002) and decrease susceptibility to misinformation (Kieckhaefer et al., 2014). Of course, rapport building usually occurs in a (face-to-face) interview setting.

Rapport-building can be less successful in video-mediated, or telephone communications compared to face-to-face interactions (Drolet & Morris, 2000; Fullwood & Finn, 2010; Straus et al., 2001) with mutual liking being harder to establish (Fullwood, 2007) and with cooperation in group tasks being considered as less effective (Yuan & Wu, 2020). As highlighted by Bailenson (2021) and discussed above, remote interviews may cause cognitive depletion of those involved, increase self-focus because of the "self-image" present in the corner of the screen and impact rapport building because of issues associated with conversational synchrony. Critically, the more a person likes their conversation partner, the more likely they will be to engage in cooperative principles (Grice, 1975). Cooperative principles refer to four maximums used to explain how people effectively communicate information. When a person wants to be helpful and informative during a conversation, they will adjust the amount (Maximum of quantity) and accuracy (Maximum of quality) of information they provide. To further support this, the communicator also ensures they include information relevant to the conversation (Maximum of relation), in a manner that is clear and precise (Maxim of manner). This is important for investigators who are interested in eliciting highly detailed statements from interviewees, as online interviewing may weaken rapport leading interviewees to provide less detailed statements. When we remove the direct face-to-face element of interviewing, we dilute people's willingness to engage in meaningful conversation or informational exchanges. This may be problematic for lie-detection tools built upon rapport building.

2 | ASYMMETRIC INFORMATION MANAGEMENT (AIM) TECHNIQUE

The AIM technique compromises of a set of instructions designed to be used at the beginning of an interview to support truth tellers (but not liars) to be more detailed (Porter et al., 2020). These instructions have been designed to highlight the metacognitive error that credibility is transparent and therefore easily detected (Gilovich et al., 1998). In other words, the initial information provided by the interviewer emphasises how difficult lie-detection is and that longer, more detailed statements can increase accurate classification. When truth tellers hear this, they quickly realise that their credibility is not transparent, and that, by complying and providing more information they will more likely be viewed as innocent. This caused a shift in verbal strategies, towards become more forthcoming. The "report everything" instruction then acts as an illustration for the level of detail the interviewer is looking for.

Liars, in contrast, are presented with the same information but use different strategies than truth tellers. Their metacognitive shift is based upon the assumption that providing less information will make lie-detection techniques less accurate and less reliable. As a result of

these instruction, liars believe that by providing less information, they can avoid detection. This caused a withholding strategy to be implemented. For liars, the report everything instruction is subsequently disregarded.

Previous research has shown that verbal differences between truth tellers and liars are magnified when the AIM instruction is administered compared to a control condition where a standard tell me everything instruction is used (Porter et al., 2020).

Although there are sound theoretical reasons for suggesting that virtual interviews are more cognitively depleting than direct face to face ones, we still propose that administering the AIM technique in a virtual interview setting will produce similar patterns of verbal disclosure. This is because, although the situation may cause depletion, the nature of the AIM instructions are simple for interviewees to process. Additionally, use of the AIM technique does not require a high level of interactional synchrony, being a brief set of instructions followed by a free recall attempt. Therefore, although research into its efficacy is needed, we expect similar patterns of disclosure. Specifically, we expect truth tellers to provide (and liars to withhold) more information when the AIM instructions are used, compared to a standard "tell me everything" instruction.

To further examine the effectiveness of the AIM technique in virtual interview settings, we explore the delivery of their disclosure (i.e., written versus spoken). Talking about an event is very different from writing about one (Farrell, 1978). When people enter a conversation, they have opportunities to assess the listeners understanding via their nonverbal cues (Daft et al., 1987; Daft & Lengel, 1986; Tung & Turban, 1998). In contrast, a handwritten statement requires more deliberation and therefore a more serious commitment to deception. As such, writing is often more complete and consequently more accurate than speaking (Sauerland & Sporer, 2011; cf. Kellogg, 2007); which makes it easier for liars to avoid detection (e.g., Burgoon et al., 2003; Hancock et al., 2010).

Based upon the above theoretical explanations, it is possible liars will reduce their overall information output as they more consciously (or deliberately) consider their statement. It is also possible that they will become aware that adding more detail to their statement will help them avoid detection. In contrast, liars providing a verbal statement have fewer opportunities to think about their answers, and fewer opportunities to change parts of their story, making it harder for them to be detailed.

For truth tellers providing a verbal recall provides an opportunity to recall their story, but also to add new information as they remember it. When providing a written statement, truth tellers are less likely to report the same level of information (Sauerland & Sporer, 2011). Based upon the above theorical predictions, truth tellers in the AIM condition will provide more overall detail than truth tellers in the control condition (Hypothesis 1a). Based on these predictions, we further expect truth tellers in the verbal recall condition to provide more overall detail than truth tellers in the written recall condition (interaction effect: interview condition × disclosure condition, Hypothesis 1b).

In relation to the AIM instructions, we expect AIM-liars to provide less overall detail than liars in the control condition (Hypothesis 2). This is consistent with previous AIM research (Porter et al., 2020). No predictions are made for liars in the verbal vs. written recall condition.

Based upon the above predicted pattern of results, more liars and truth tellers will be accurately distinguished in the AIM instruction condition compared to the control condition using overall detail as the dependent measure (Hypothesis 3).

3 | METHOD

3.1 | Pre-registration

This study was pre-registered (see https://osf.io/we2dt).

3.2 | Design

A 2 (veracity: truth teller vs. liar) × 2 (interviewing condition: asymmetric information management "AIM" technique vs. control condition) × 2 (disclosure type: verbal vs. written) between factors design was used. The control condition contained a standard "report everything" instruction widely used in research on investigative interviewing.

3.3 | Participants

A total of 171 participants (105 females, 65 males, 2 identifying as other, and 1 prefer not to say) aged between 18 and 73 years ($M = 27.89$ years, $SD = 10.19$) participated in this study. The sample consisted of 107 university students, 21 staff and 43 members of the public. No difference in age, $t(169) = -.09$, $p = .928$, or gender, $\chi 2(4, n = 171) = 1.48$, $p = .688$, emerged between truth tellers and liars.

3.4 | Sample size rationale

A power analysis using G*Power (Faul et al., 2007), assuming a medium effect size of $f = .25$ (alpha = .05) for eight groups, indicated a minimum sample size of 146 would be sufficient for an acceptable power of .85 (Cohen, 1992).

For tests that examine interaction effects (e.g., the Veracity × Interview type explored in the current study), G-power tends to provide over-generous power estimates (i.e., it underestimates the number of required participants to achieve 80% power; for more information, see Brysbaert, 2019). To take this into account, and to compensate for any potential participant attrition (i.e., participants not following experimental instructions and requiring exclusion), an additional 22 individuals (approximately 15% of the original G*Power estimate) were recruited, allowing for $n = 21$ participants per experimental cell.

3.5 | Procedure

Participants were recruited via adverts placed on the researcher's social media accounts (i.e., Facebook, Twitter, LinkedIn), or via the university department's course pages.

Potential participants were informed that they had to be at least 18 years old with good spoken English to take part in the study, due to the interview requirement. Those who were interested in the study were emailed an information sheet outlining the study and the requirements. They were informed that they would receive a £5 Amazon voucher and a conference fee waiver for their time. The conference contains talks about lie-detection and includes the findings from this study. If participants wanted to take part in the study, they were asked to provide informed consent. They were emailed a consent form and asked to electronically sign this. After providing informed consent, the experimenter arranged a timeslot for the study which took place over Zoom.

Upon entering the Zoom room each participant was randomly assigned to either the truthful or deceptive condition.

Truth tellers ($n = 85$) were asked to go on a 30-minute walk away from their current location. Whilst on their walk they were asked to take a selfie or a photograph of their surroundings to email to the experimenter approximately 15 minutes into their walk. This ensured that truth tellers genuinely did engage with the task.

Liars ($n = 86$) were asked to take part in an online questionnaire and to remain in their current location. The experimenter turned their camera off but reminded the participant that they were available. The questionnaire contained 20 questions, some of which had multiple sections. The questionnaire took approximately 30 minutes to complete. This was to ensure that truth tellers and liars tasks were matched in terms of time.

Upon completing the questionnaire or returning from their walk, all participants were informed that there was an online data breach and as a result they had to be interviewed about their whereabouts at the time. Truth tellers were instructed to be honest about their 30 minute walk. In contrast, liars (who were all online at the time of the incident) were instructed to pretend that they had gone for a 30-minute walk. They were reminded not to mention the questionnaire they took part in.

All participants were provided up to 10 minutes to prepare for the interview. The experimenter turned their camera off and waited until the participant stated they were ready. Participants were reminded that the interviewer did not know what condition they were in, and that their task was to sound convincing. Participants were also told that they would receive £5 if the interviewer believed them.

Once participants indicated they were prepared for the interview they were asked to complete a pre-interview questionnaire. Demographic information such as age, occupation and gender identity were collected. Participants were asked to rate their motivation "to what extent do you feel motivated to perform well—that is, appear convincing—during your interview" (7-point Likert scale "1- not at all" to "7- completely") and preparation levels "how prepared for the interview do you feel" (7-point Likert scale "1- extremely unprepared" to "7- extremely prepared").

Next participants were sent through to a breakout room where the interviewer was waiting. The interviewer was blind to veracity condition and the experimental hypotheses. Each participant was randomly allocated to an interviewing condition (AIM versus control) and a disclosure condition (verbal versus written).

3.6 | Interview

Upon entering the breakout room, the interviewer introduced themselves and explained that the interview would be video recorded. Rapport building questions (such as asking how the participant was) and active listening (i.e., smiling, nodding, and verbal uh-huh's) were used.

The interviewer began with the following introduction, regardless of interviewing condition:

"As you are aware, sensitive information has leaked. I am told that you were in the university system at the time of this breach, and as such you are suspected of involvement. Now, I do not know if you are involved or not. It is simply my task to collect your statement for lie-detection analysis."

In the AIM condition the following instructions were read:

> *AIM instructions*
> First, however, please pay close attention to the following information.
> During interviews, individuals frequently over-estimate how easily an analyst can determine if they are being deceptive or honest.
> Actually, lie detection is not easy and I cannot take your honesty for granted. However, you can make it easier for us to determine if you are being honest or lying.
> This is because our lie detection techniques become more accurate and reliable the more information you provide.
> If you provide a longer, more detailed statement, we will be better able to classify you as either honest or lying.

After hearing the AIM instructions, one standard free recall question was asked. In the control condition only the standard free recall question was asked "please tell me—in your own words—everything that happened during the previous 30 minutes".

Participants were asked to provide either a verbal statement ($n = 84$) or a written statement ($n = 87$) via an online google document.

Upon completion of the interview, the participants returned to the experimenter who provided a link to the post interview questionnaire. This was designed to gather information on the perception of detail provided "during the interview, to what extent did you believe providing more details would make determining the credibility of your

statement easier?" (7-point Likert scale "1- not at all" to "7- to a great extent"); rapport with the interviewer "to what extent did you feel that you had good rapport with the interviewer?" (7-point Likert scale "1- not at all" to "7- to a great extent"); and a rating of truthfulness "To what extent did you tell the truth during your statement" (percentage scale ranging from 0% to 100%). Finally, participants were asked "how likely is it that you have convinced the interviewer and will therefore receive the £5?" (7-point Likert scale "1- extremely unlikely" to "7- extremely likely").

Participants were then debriefed, thanked, and invited to ask the experimenter questions.

3.7 | Coding

The audio-recorded interviews from participants who provided a verbal free recall were transcribed verbatim. The written statements were coded directly.

All statements were rated by one coder (blind to the experimental conditions and hypotheses) who scored the occurrence of overall detail. That is the combined total of: (i) spatial detail, (ii) temporal detail, (iii) perceptual detail, (iv) and action detail. Spatial, temporal and perceptual detail are part of the Reality Monitoring framework (see Johnson & Raye, 1981), commonly used in the lie-detection literature (Vrij, 2008). Action details (details about others' or one's own activities) are not included in the Reality Monitoring's coding scheme (Memon et al., 2010, Vrij, 2008), but depict sensory information that should be included in analysis (for a similar observation see Porter et al., 2018, 2020). Spatial details refer to information about locations, or arrangements and/or objects (e.g., "I went towards the park, then turned right and seen the statue"), temporal details relate to information about when the event happened or explicit descriptions of the sequence of various events (e.g., "I arrived at the shop at around 2 PM and then looked for the milk"), perceptual details relate to information about what was seen, heard, felt, tasted, and smelt during the described activities (e.g., "I saw a woman at the park area who spoke to me"), and action details relate to information that explicitly describes an action or the process of actions performed by the interviewee (e.g., "I ran back because of the rain").

3.8 | Reliability coding

To assess the reliability of the coding, a second coder (also blind to the experimental conditions) coded a random selection of 43 statements (25% of the sample). Inter-rater reliabilities between the two coders for the frequency of overall detail were measured via intra-class correlation coefficients (ICC), using the two-way random effects model measuring overall detail. The ICC was high and therefore satisfactory for overall detail [ICC average measures] = .93.

4 | RESULTS

4.1 | Motivation

Before the interview, truth tellers ($M = 5.66$, $SD = 1.28$, 95% CI [5.37, 5.96]) and liars ($M = 5.54$, $SD = 1.44$, 95% CI [5.24, 5.83]) reported similar motivations to perform well, $F(1, 163) = .357$, $p = .551$, $d = .09$, 95% CI [−.21, .39]. There were no differences between the interview (AIM vs. control) or disclosure (verbal vs. written) conditions and no interaction effects emerged, all Fs <1.48, all ps > .226.

4.2 | Preparation

Before the interview, truth tellers ($M = 5.02$, $SD = 1.48$, 95% CI [4.71, 5.35]) and liars ($M = 5.01$, $SD = 1.49$, 95% CI [4.71, 5.34]) reported similar levels of preparation, $F(1, 163) = .001$, $p = .981$, $d = -.01$, 95% CI [−.29, .31]. There were no differences between the interview (AIM vs. control) or disclosure (verbal vs. written) conditions and no interaction effects emerged, all Fs <2.12, all ps > .147.

4.3 | Perceptions of instructions

A 2 (veracity: truth tellers vs. liars) × 2 (interview condition: AIM technique vs. control) × 2 (disclosure type: verbal vs. written) between-subjects ANOVA was conducted on perceptions of whether participants believed that providing more detail would make their credibility easier to determine.

A main effect of veracity emerged, $F(1, 163) = 10.86$, $p = .001$, $d = .49$, 95% CI [−.18, .79] with truth tellers ($M = 4.94$, $SD = 1.65$, 95% CI [4.59, 5.30]) being more likely than liars ($M = 4.12$, $SD = 1.70$, 95% CI [3.76, 4.46]) to believe that providing more information made them appear more credible to the interviewer. An interaction effect for veracity × condition also emerged, $F(1, 163) = 5.17$, $p = .018$, $f = .18$. Truth tellers in the AIM condition ($M = 5.07$, $SD = 1.82$, 95% CI [4.58, 5.57]) more strongly believed that providing more details would make determining their credibility easier to determine compared to liars ($M = 3.64$, $SD = 1.71$, 95% CI [3.14, 4.15]), $t(63) = 3.73$, p > .001, $d = .81$, 95% CI [.36, 1.24]. Truth tellers ($M = 4.81$, $SD = 1.47$, 95% CI [4.31, 5.31]) and liars ($M = 4.58$, $SD = 1.58$, 95% CI [4.09, 5.07]) in the control condition did not differ, $t(84) = .73$ $p = .465$, $d = .16$, 95% CI [−.27, .58].

There were no main effects for interview condition or disclosure type, and all other interactions were not significant, all Fs <2.77, all ps > .098.

4.4 | Veracity manipulation check

Truth tellers reported being more honest ($M = 90.12$ $SD = 22.81$, 95% CI [84.88, 94.44]) in their statements than liars ($M = 14.65$, $SD = 23.90$, 95% CI [9.89, 20.00]), $t(169) = 21.12$, p > .001, $d = 3.23$,

95% CI [2.76, 3.67]. This indicates that participants followed the experimental instructions.

4.5 | Rapport

Participants were asked to rate the rapport they had with the interviewer. A main effect for disclosure type emerged, $F(1, 163) = 15.52$, $p < .001$, $d = .58$, 95% CI [.27, .88] with participants in the verbal condition ($M = 5.23$, $SD = 1.48$, 95% CI [4.87, 5.59]) reporting greater interviewer rapport than those in the written condition ($M = 4.22$, $SD = 1.98$, 95% CI [3.86, 4.57]). A main effect for veracity also emerged, $F(1, 163) = 18.08$, $p < .001$, $d = .62$, 95% CI [.31, .93] with truth tellers ($M = 5.27$, $SD = 1.70$, 95% CI [4.91, 5.66]) reporting greater interviewer rapport than liars ($M = 4.18$, $SD = 1.79$, 95% CI [3.82, 4.53]). No other differences emerged, all $Fs < 2.27$, all $ps > .134$.

4.6 | £5 reward

Participants were asked how likely it was that they would have convinced the interviewer and won the £5 reward. A main effect for veracity emerged, $F(1, 163) = 64.42$ $p < .001$, $d = 1.24$, 95% CI [.91, 1.56] with truth tellers ($M = 5.77$, $SD = 1.09$, 95% CI [5.46, 6.07]) feeling more confident than liars ($M = 4.01$, $SD = 1.68$, 95% CI [3.71, 4.31]) that they were believed by the interviewer. No other differences emerged, all $Fs < 1.87$, all $ps > .174$.

4.7 | Hypothesis testing

Due to the ongoing concern in psychological science regarding the usefulness of null hypothesis significance testing as a data analysis strategy (e.g., Cohen, 1994; Cumming, 2014), a Bayes Factor (BF) score using JASP software was calculated (see Dienes, 2016; Wagenmakers et al., 2016).

4.8 | Frequency of overall detail

A 2 (veracity: truth tellers vs. liars) × 2 (interview condition: AIM technique vs. control) × 2 (disclosure type: written vs. verbal) ANOVA, with overall detail as a dependent variable, revealed a main effect for veracity, ($F(1, 163) = 17.24$, $p < .001$, $d = .55$, 95% CI [.25, .86]), and interviewing condition, ($F(1,163) = 13.13$ $p < .001$, $d = .48$, 95% CI [.17, .78]). Truth tellers ($M = 72.06$, $SD = 71.06$, 95% CI [61.85, 82.28]) reported more overall detail than liars ($M = 41.77$, $SD = 31.02$, 95% CI [31.61, 51.93]), and the AIM technique ($M = 70.55$, $SD = 72.52$, 95% CI [59.92, 80.35]) elicited more overall detail than the control condition ($M = 44.03$, $SD = 29.37$, 95% CI [33.54, 53.86]).

A significant interaction for veracity × interview condition emerged, $F(1, 163) = 45.76$, $p < .001$, $f = .53$. A follow up t-test revealed that truth tellers reported more overall detail in the AIM condition ($M = 109.86$, $SD = 81.97$, 95% CI [86.47, 136.11]) compared to truth tellers in the control condition ($M = 34.17$, $SD = 22.24$, 95% CI [27.80, 41.25]), $t(83) = 5.78$, $p < .001$, $d = 1.15$, 95% CI [.78, 1.71]. This analysis supports hypothesis 1a. Bayesian analysis showed extreme evidence in support of the alternative hypothesis, compared to the null hypothesis ($BF_{10} = 183{,}840$).

In contrast, liars in the AIM condition ($M = 30.31$, $SD = 24.78$, 95% CI [23.37, 38.29]) reported fewer overall details than liars in the control condition ($M = 53.45$, $SD = 32.38$, 95% CI [44.53, 63.16]), $t(84) = -3.71$, $p < .001$, $d = .80$, 95% CI [.35, 1.23]. This analysis supports hypothesis 2. Bayesian analysis showed extreme evidence in support of the alternative hypothesis, compared to the null hypothesis ($BF_{10} = 141$).

No main effect for disclosure type emerged, and no other interaction effect emerged, all $ps > .389$, all $Fs < .75$. No evidence of difference was found for the disclosure type impacting information elicitation, as shown in Figure 1. Based upon this data no support for Hypothesis 1b was found.

4.9 | Classification rates

Discriminant analyses tested the ability of "overall detail" to differentiate between truth tellers and liars in the AIM technique and control conditions. In all cases, veracity was the classifying variable. The data was cross-validated by reporting the "leave-one-out" classification data. Kleinberg et al. (2019) recommend "leave-one-out" cross-validation as a safeguard against accuracy overestimation in verbal lie-detection research.

Veracity classification rates were higher in the AIM condition (72%), compared to the control condition (59%), as shown in Table 1. These findings suggest that the AIM technique can be used to discriminate between truth tellers and liars, supporting Hypothesis 3. The discriminant analysis is here primarily for practitioners and non-specialised readers.

4.10 | Receiver operating characteristic (ROC) analyses

To complement the series of discriminant analyses (and to formally test Hypothesis 3), two Receiver Operating Characteristic (ROC) analyses were conducted for overall detail. This is because, unlike discriminant analysis, the Area Under the Curve (AUC) of a ROC curve (with 1 - specificity, i.e., false positive rate, plotted on the x-axis and sensitivity, i.e., true positive rate plotted on the y-axis) provides a measure of the diagnosticity of the criterion, and allows for a direct comparison of the AIM and control condition.

When a deceptive case is labelled as deceptive, the numerator increases. When an honest case is labelled as honest, the denominator decreases, as shown in Figure 2. The AUC describes the proportion of

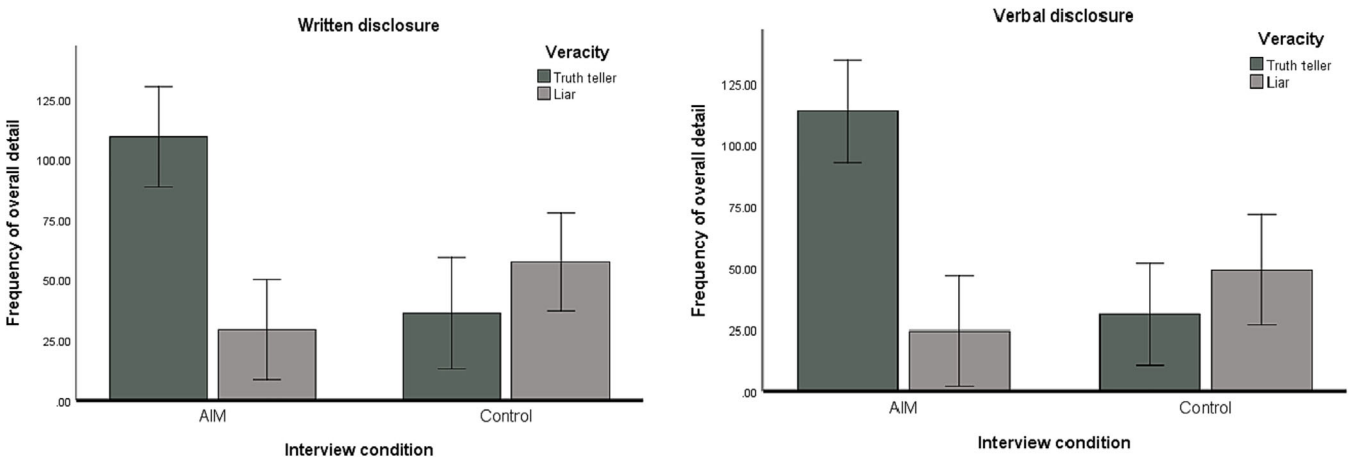

FIGURE 1 Bar graph showing the overall details for truth tellers and liars in the AIM and control interviewing conditions as a function of disclosure type (written versus verbal). Error bars represent 95% CIs.

TABLE 1 Discriminant analysis for the frequency of overall detail as a function of interview condition.

	Accuracy rate (%)							
	Truths	Lies	Total	Wilks lambda	Chi square	Canonical correlation	*p* value	*F* value
AIM technique	51.2	92.9	71.8	.696	29.94	.55	<.001	36.31
Control condition	66.7	52.3	59.3	.891	9.64	.33	.002	10.28

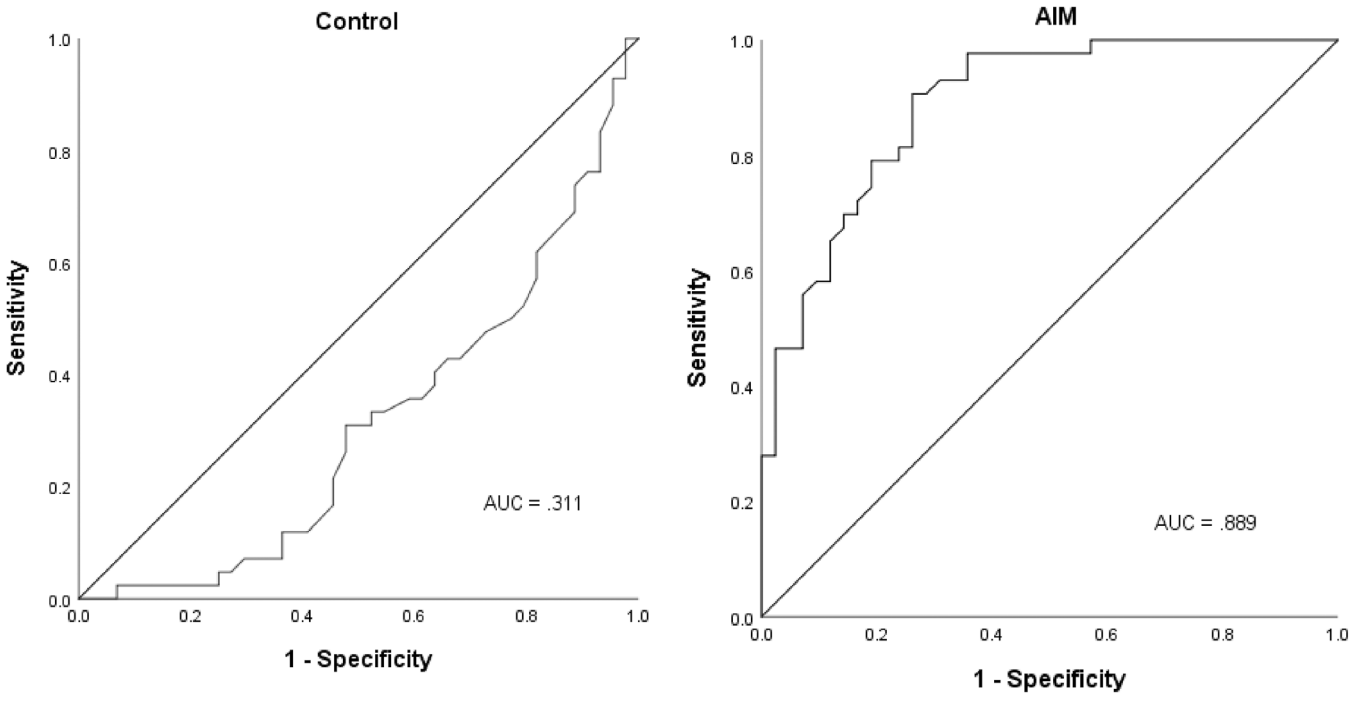

FIGURE 2 Receiver operating characteristic (ROC) curve with area under the curve (AUC) for overall detail in the AIM and control condition.

target cases that scored higher on the discriminating variable than did non-target cases, or the likelihood that any randomly chosen target case will have a higher score than a randomly chosen non-target case.

A direct comparison shows that the AIM technique (AUC = .89, *SE* = .03) was more effective at correctly classifying truthful statements compared with the standard free recall question used in the control condition (AUC = .31, *SE* = .06), $p < .001$. Therefore, Hypothesis 3 is supported.

5 | DISCUSSION

The current study demonstrated that the AIM technique can be successfully adapted for use in online virtual interviewing. The original AIM study used by Porter et al. (2020) used this technique in a face-to-face interview setting, whereas we used remote interviewing via Zoom. We found that the AIM instructions enhanced information elicitation for truth tellers, whilst simultaneously encouraging liars to withhold information, similar to Porter et al. (2020). For truth tellers, the initial AIM instructions emphasised how difficult lie-detection is and that longer, more detailed statements allow more accurate classification. They quickly realise that their credibility is not transparent, and that, by complying and providing more information they will more likely be viewed as innocent. This caused a shift in verbal strategies, towards become more forthcoming. The "report everything" instruction then acts as an illustration for the level of detail the interviewer is looking for.

Liars, in contrast, were presented with the same set of instructions but had different reporting strategies than truth tellers. Theoretically, their metacognitive shift may be based upon the assumption that providing less information will make lie-detection techniques less accurate and therefore less reliable. As a result of these instructions, liars may have believed that by providing less information, they could avoid detection.

The information elicitation effect found in our study is supported by null significant hypothesis testing and Bayesian analysis. We found extreme evidence in support for the alternative hypothesis. With the addition of the large effect sizes, we can conclude that truth tellers ($d = 1.15$) and liars ($d = .80$) implement different verbal strategies when listening to the AIM instructions.

As well as eliciting more information from truth tellers, we wanted to test whether this technique could enhance lie-detection (using discriminant analysis) based upon the overall detail provided by interviewees. We found that it did. In practical terms, within the control condition where a standard "report everything" instruction was used, the accuracy rate (for determining veracity) was 59%, consistent with the literature showing accuracy levels around chance expectancy (DePaulo et al., 2003). In the AIM condition, accuracy levels reached 72%, demonstrating a higher accuracy level for correctly classifying truth tellers and liars. We also tested this effect using a more robust method: ROC analyses. This showed the AIM technique was more effective at correctly classifying truth tellers and liars, based on the overall detail they provided within their statement.

As part of this research, we wanted to investigate whether the AIM technique would be impacted by the disclosure modality of interviewees. Specifically, we were interested in whether differences emerged between interviewees who provided a written statement versus those who provided a verbal recall. We predicted that truth tellers would be more forthcoming when providing an audio recall rather than a written statement. Our data did not support this. It is possible that the increased familiarly with online tools such as Google Docs has led to greater ease.

There were also no differences found in the amount of information produced between liars who provided a verbal or written statement. It is plausible that allowing participants to edit and change their written statement will only have an impact on credibility assessments in human raters. When providing a verbal statement, interviewees can correct themselves or repeat parts of the story which they cannot delete. When writing a statement, using an online document, interviewees can edit and change what they have written. They are also able to read their statement and make changes based upon what sounds plausible. Future research could assess this in two ways; (1) examining the metadata to assess whether liars are editing their statements, and (2) assessing whether plausibility as a lie detection measure (DePaulo et al., 2003; Vrij et al., 2021) is impacted by the disclosure type. Specifically, future research could assess whether written statements appear more plausible than verbal statements that have been transcribed verbatim.

We also assessed whether rapport with the interviewer would be reduced when interviewees are asked to provide a written statement rather than a free recall. We found that this was the case. Although the disclosure type (verbal recall versus written statement) did not impact the amount of overall detail elicited from participants, rapport was reduced when participants were instructed to write their statement rather than to verbally recall it. This could impact the quality of information provided. It is plausible that seeking information about a sensitive or personal topic would be more greatly affected by this reduced level of interviewer rapport. We asked participants to provide a statement about a previous 30 minute walk. Future research could investigate the effectiveness of rapport when written versus verbal disclosures are used on sensitive topics or more personal experiences.

Interestingly, we found that truth tellers felt they had greater rapport with the interviewer compared to liars. This makes sense as the objective of truth tellers is often to aid investigations. The AIM instructions (versus the control instructions) had no impact on the interviewer - interviewee rapport. The AIM instructions could be perceived as being accusatory as they highlight that the interviewer is collecting statements to determine who is being honest and who is lying. This is important as we want to create instructions that aid lie detection without causing truth tellers to withhold information. Truth tellers are more likely to engage with an interviewer they have greater levels of rapport with. Our instructions appear as effective as a standard tell me everything instruction.

Delivering information or complex instructions through online video calling software can be more difficult to understand compared to face-to-face conversations (Straus et al., 2001). This may have impacted the quality of the AIM instructions, or participants understanding of them. Future research could assess the clarity of the interviewing instructions through this online interview setting. One option to support the exchange of information could be to provide the written instructions on the screen whilst the interviewer also reads them. To allow us to better understand how the AIM technique compares across different settings, a direct comparison between online interviews and face-to-face interviewing is needed. Future research could also examine the effectiveness of the AIM technique between face-to-face and digital settings – relative to some of the other lie-detection techniques such as a Model Statement (Leal et al., 2015; Porter et al., 2018; Porter & Salvanelli, 2020).

Our data was coded based upon the total detail reported by participants. Oral statements were transcribed and then coded whilst written statements were directly coded. It is plausible that word count standardisation could yield different results (for an example of this method, see Elntib et al., 2015; Larson & Granhag, 2005; Stromwall & Granhag, 2005). Word count standardisation refers to the raw frequencies reported per 100 words. Elntib et al. (2015) found that oral statements (transcribed to allow for coding) contained more evidence of reality monitoring criteria before standardisation for word count, whereas written statements were denser and contained more evidence of reality monitoring criteria after standardisation. It is possible that our data, particularly the written statements could be enhanced using word count standardisation. In the current form the AIM instructions resulted in greater information elicitation for truth tellers, and greater information suppression from liars compared to the control condition. Future research could test the effectiveness of other measures to assess whether this enhances the AIM techniques abilities.

5.1 | Practical implications

Although in its early stages, the AIM technique appears to be a promising new technique (Porter et al., 2020). Unlike other tools in the lie-detection literature, investigators can easily introduce these instructions without concerns that it will prompt liars into providing the same level of detail as truth tellers. Other tools such as the Model Statement used within the "encouraging interviewees to say more literature" prompt all interviewees to report more information (e.g., Leal et al., 2015), making differentiating between truth tellers and liars difficult (for a critical analysis see Porter et al., 2021). Our technique works by encouraging truth tellers to report more information whilst encouraging liars to withhold information, making detecting veracity differences possible.

In conclusion, our findings show that a simple set of instructions can prompt quite different behaviour from truth tellers and liars, allowing better discrimination between them. These instructions represent an advance over existing protocols that should be easy for practitioners to implement, and which are effective when used with new interview processes incorporating virtual and remote communication. It should be noted that the AIM technique is judgement based and that there is no specific cut-off point of detail which will tell investigators if their suspect is lying or telling the truth. Instead, this technique should be used as part of an investigators toolkit which is combined with professional judgement and other information elicitation and/or lie-detection tools. Future research could examine adapting the AIM technique to be used in a within-subjects manner (i.e., administering the AIM technique after an initial recall). This may allow investigators to more easily detect veracity based upon that individuals own statements.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data may be made available upon reasonable request.

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