**Virtual versus Face-to-Face Assessment Center:**

**Candidates’ and Assessors’ Viewpoints**

**Abstract**

Developments in communication technology have significantly influenced selection processes with regard to human resources. Advanced technology makes it possible to conduct virtual assessments based on synchronic video conferencing (VC). In addition, restrictions due to the coronavirus disease 2019 (COVID-19) pandemic have increased the use of virtual assessment centers (VACs); however, little research has been published on this topic. The current study focuses on the ways in which candidates and assessors perceive VACs. The paper details two field studies conducted with candidates and assessors in two types of assessment centers (ACs)—virtual and face-to-face (FTF)—for various military positions. The assessors and candidates were asked to complete anonymous questionnaires concerning their perceptions of these ACs. The first study focused on assessors (*N* = 41) and demonstrated that their level of confidence was lower for VACs compared to FTF ACs. In addition, their level of confidence varied between exercises and depended on the assessors’ experience with VACs. The second study focused on fairness perceptions among candidates (*N* = 4,762). We found that fairness perceptions were similar between the two AC types. This research enhances understanding of how the transition from FTF ACs to VACs is perceived, and can help in the implementation of VACs.

Keywords: virtual assessment center, virtual simulation, virtual leaderless group discussion, personnel selection, fairness perception

**Introduction**

 The rapid advancement of innovative technologies has led to the emergence of a wide variety of new tools used for selection processes in human resources (McCarthy et al., 2017). Virtual selection tools are typically low-cost and highly accessible, and significantly increase the speed with which selection processes can be completed (Chapman & Rowe, 2001; Chapman & Webster, 2001, 2003; Galen Kroeck & Magnusen, 1997). For example, many companies have expanded their use of video conferencing (VC) platforms to conduct job interviews (Sears et al., 2013). A major contributing factor in this regard has been the coronavirus disease 2019 (COVID-19) pandemic that broke out in late 2019, since restrictive guidelines made it difficult to perform face-to-face (FTF) selection (Jones & Abdelfattah, 2020; Joshi et al., 2020). Based on such developments, it can be expected that the use of VC technology for conducting assessment centers (ACs) will also increase.

 However, a review of the literature indicates that no research has yet been conducted on virtual assessment centers (VACs). The few studies focused on virtual selection tools have instead considered other technology-based selection tools, such as Web-based tests (e.g., cognitive tests) or VC-based interviews (Stone et al., 2013). Woods et al. (2020) highlighted this research gap in the field of digital selection procedures in general, and regarding Internet-based techniques in particular. Thus, while the rate of development and use of digital selection procedures in practice are rapidly increasing, scientific research on the topic is lacking.

 Several researchers have suggested that technological selection tools are fundamentally different from traditional selection tools, and as such there is a need to understand the unique challenges of technological selection (Chamorro-Premuzic, Winsborough, Sherman, & Hogan, 2016; Tippins, 2015; Woods et al., 2020). Some organizations use new technologies without understanding how they are perceived by candidates and assessors, which could potentially harm the organization (Woods et al., 2020). For example, candidates who perceive a selection process as unfair will have negative reactions to it and may consequently exhibit poor performance and motivation during the process, perhaps even ceasing their participation part-way through (Smither et al., 1996; Hausknecht et al., 2004). Likewise, assessors who face difficulties addressing technical and other issues of VACs (e.g., video lag issues) may lack confidence in their assessments and make inaccurate judgments, which may impair the validity of the AC.

 The present work aims to deepen understanding of candidates’ and assessors’ perceptions of VAC selection tools, and to compare these perceptions with those of FTF ACs. To the best of the authors’ knowledge, this is the first study to examine candidates’ and assessors’ perceptions of VACs; therefore, the study makes unique and significant contributions to the field. The research entails two studies: the first focuses on assessors’ reactions to a VAC in comparison to a FTF AC; the second examines candidates’ reactions to a VAC in comparison to their reactions to a FTF AC. The findings of the two studies could help managers of organizations to better understand some of the implications of using VACs instead of FTF ACs, and to make decisions based on the new empirical evidence provided.

**Face-to-Face Assessment Centers versus Virtual Assessment Centers**

 The goal of selection processes is to identify candidates who are most suited to the requirements of the job to which they have applied (Stone et al., 2013). ACs as a selection tool have been in use for over 50 years, and comprise one of the most accepted methods for human resource selection around the world (Howland et al., 2015; Kleinmann & Ingold, 2019). Unlike other selection tools, such as questionnaires or interviews, which do not involve interpersonal communication and are based on the candidate’s self-report, ACs entail interpersonal communication. In each exercise social communication takes place between the candidates in the context of the exercise, which evokes actual behaviors (Kleinmann & Ingold, 2019). Assessors at ACs evaluate the behaviors of candidates as the candidates perform a variety of exercises that simulate work-related situations (e.g., role-plays and group discussions [Kleinmann & Ingold, 2019]).

 Technological advances in the last decade, and the availability of VC for anyone with a modern laptop, smartphone, or tablet (Bohannon et al., 2013), have led to the widespread use of VC in organizations in general, and in personnel selection specifically. A growing number of organizations have begun to use VC in recruitment and selection, including for conducting interviews, as an adjunct or alternative to FTF interviews (Vadi et al., 2016). The use of VC helps organizations to deal with increasing pressure to expand recruitment and selection activities while streamlining and reducing recruitment and selection costs, and to save time (Chapman & Rowe, 2001; Chapman & Webster, 2001, 2003). The combination of technological advances and the organizational need to streamline, and reduce resources dedicated to, selection processes has led organizations to move toward conducting ACs via virtual platforms based on synchronous VC.

 FTF ACs and VACs have several key characteristics in common. The first of these is their end goal, which is to gather relevant information about candidates for a defined target position in order to make decisions regarding acceptance or rejection of candidates. The second common characteristic is that they both require candidates to perform group and individual tasks, such as group exercises, themed presentation exercises, or role-playing exercises, that produce actual behaviors. The third characteristic is that they both involve assessors who observe the performance of the candidates and evaluate them according to predefined metrics. Unlike other corporate communication tools, VC-based communication is able to replicate many aspects of the FTF communication experience. Candidates and assessors can see the responses of others in the conversation (e.g., smiling, grimacing, disinterest, enthusiasm) with the help of cues, whether voluntary or involuntary, from the audio and visual channels (Campbell, 1998; Croes et al., 2019; Palmer & Simmons, 1995).

 The main difference between the two AC types is the platform through which the AC is conducted. In FTF ACs, the communication between candidates and assessors takes place in person, and candidates perform the group and individual tasks at the selection site in the presence of the assessors and other candidates. In VACs, communication among the participants occurs via a video call (for example, using Zoom or Skype software); candidates and assessors are not in the same location but are connected in “real” time via the platform.

In this study, the term VAC refers not to conducting remote tests or video-based interviews but to exercises in which video call–based communication takes place between participants and assessors. The emergence of this new type of AC raises questions about candidates’ and assessors’ perceptions of VACs in comparison to traditional ACs.

**Study 1: Assessors’ Level of Confidence in Virtual Assessment Centers**

*Virtual Assessment Compared to Face-to-Face Assessment*

 A review of literature on the effect of virtual assessments (via VC) on selection processes reveals that studies published to date have focused on assessment via VC with respect to interviews only (Blacksmith et al., 2016; Chapman & Rowe, 2001). We were unable to locate any papers on video-based ACs—the focus of this research. However, several features of synchronous VC–based interviews are similar to those of VACs. In both, video-mediated communication takes place through technological means (such as a computer, tablet, or smartphone), and participants and assessors are not present in the same physical environment (Croes et al., 2019). In addition, interpersonal communication occurs between the assessor and the candidate in “real time” (Wegge, 2006). These similar characteristics allow us to draw upon studies that have examined video-based interviews for our study of video-based VACs.

 The studies on interviews have highlighted two main differences between video-based virtual communication and FTF communication. The first focuses on conveying nonverbal cues (Joshi et al., 2020). Human communication consists of a combination of verbal and nonverbal cues of various kinds. According to media richness theory, communication channels differ in the amount of communication cues and the information they convey (e.g., verbal, visual, emotional, and behavioral) in a given period of time, wherein the more communication paths used in transmitting information from the sender, the better the recipient understands the information and the lower the risk of failed communication (Daft et al., 1987). While FTF communication is the richest form and conveys many kinds of cues naturally (Daft & Lengel, 1986), video interviews, due to the lack of physical encounter, limit participants’ ability to convey and observe nonverbal cues and behavior (Chapman & Rowe, 2001).

 In VC, fewer nonverbal behaviors of candidates, such as eye contact and body language, are conveyed, which makes it challenging for assessors to evaluate candidates’ abilities (McColl & Michelotti, 2019; Sears et al., 2013). Eye contact is one of the most important nonverbal cues for communication: The feeling that a recipient is looking into the speaker’s eyes is important, and increases trust (Bohannon et al., 2013). In video-based communication, direct eye contact is impaired because the image resolution is limited and the camera angle may not be ideal (Sellen, 1995). The camera is typically located slightly offscreen and therefore it can seem that the conversation partner is looking downwards even if they are in fact looking straight into their partner’s eyes on their own screen, and thus a mismatch is created and eye contact is impeded (Bohannon et al., 2013).

 In addition, body language information is significantly reduced in VC because participants usually see only the upper body (Joshi et al., 2020). As a result, participants are unable to convey all of the cues present in FTF conversation (Croes et al., 2019); for example, the possibility of observing nonverbal behaviors such as hand gestures is reduced (Sellen, 1995). In order for more nonverbal cues to be transmitted, the camera needs to capture the hands and arms (Bohannon et al., 2013). Evaluation processes have been found to be influenced by the degree of exposure to nonverbal behavior (DePaulo, 1992); thus, in the context of ACs it is hypothesized that communication in FTF ACs is richer than in video-based ACs, just as communication in FTF interviews is richer than in video interviews.

 The second difference between virtual and FTF communication focuses on signal distortion due to the technological involvement in video-based communication. While FTF communication has no technological aspects at all, VC-based communication takes place via a technological platform and is thus limited by the capabilities of the platform. Technological difficulties and problems, such as delays in the transmission of verbal messages, lack of synchronization between audio and video signals, and interruptions in conversation, pose significant challenges for professionals. These technological problems may give rise to the need to repeat what has been said, or to rephrase questions that directly affect the media (McColl & Michelotti, 2019). Due to the lower levels of nonverbal information and lower technological capabilities in VACs compared to FTF ACs, we hypothesize that:

 *Hypothesis 1:* Assessors’ level of confidence in their evaluations will be lower in VACs than in FTF ACs.

Due to the limitations of home cameras through which VACs are conducted, such as a restricted field of view, all exercises in VACs are typically performed in a seated position. In contrast, in FTF ACs some exercises are usually performed seated while others require candidates to stand. We assume that the degree of confidence of assessors toward different exercises conducted in a VAC will vary depending on the degree of similarity between how those exercises are performed in VACs and FTF ACs. In this study, a high degree of similarity refers to a “seated exercise” that the candidate performs in both a FTF AC and a VAC. In contrast, a low degree of similarity refers to a “standing exercise” which is an exercise that the candidate performs while standing and moving about the room in a FTF AC, but performs seated in a VAC.

According to media richness theory (Daft et al., 1987), there are a number of communication channels that transmit information. In a standing exercise in a FTF AC the information passes through a number of channels; in a VAC these are reduced, since the exercise is performed in a seated position. Therefore, much of the body language information conveyed through the standing exercise in a FTF AC is lost when the same exercise is conducted in a VAC. In contrast, in a seated exercise the candidate performs the task in a seated position in both AC types. The reduction in communication channels for the standing exercise in the VAC will in turn reduce the information conveyed about the candidate, and may therefore impair the assessors’ level of confidence in evaluating these exercises in the VAC.

*Hypothesis 2:* In a VAC, assessors’ level of confidence will vary between the different exercises depending on the degree of similarity between how the exercise is performed in a FTF AC versus in a VAC, such that the level of confidence in providing assessments in the VAC will be higher for seated exercises than for standing exercises.

 A question arises as to whether and how the assessors’ level of confidence in VACs will change with their work experience. According to Bandura’s (1977) learning theory, performance improves with practice; that is, the more experience people gain at work, the more expertise and knowledge they develop and the more their performance at work improves (Hunter, 1986; Ree et al., 1995; Schmidt et al., 1986). For example, in a meta-analysis by Quińones et al. (1995), a relationship was identified between experience and performance. Therefore, as part of this study, we assume that the more experience assessors have with evaluating in VACs the more expertise and knowledge they will acquire, and the more accurate their overall assessment will be. It is thus hypothesized that an improvement in assessment ability will have a positive effect on feelings of confidence in providing assessments among evaluators.

 *Hypothesis 3:* Assessors’ level of confidence in conducting evaluations in a VAC will improve as they gain more experience in VAC evaluations.

The differences between exercises (as presented in hypothesis 2) should also influence assessors’ improvement in confidence over time (hypothesis 3), and not just their level of confidence. We suggest that the experience gained over time has the potential to help assessors evaluate the standing exercises in VACs, which differ in terms of mode compared to when they are carried out in FTF AC, which the assessors previously assessed and had experience with. On the other hand, since for seated exercises the assessors already had comparable experience from FTF ACs, there will be little contribution to their experience in VACs. In other words, the extent to which assessors improve will depend on the degree of similarity between how the exercise is performed in a FTF AC versus a VAC.  In exercises that are performed and assessed in a similar manner (seated exercises), the experience gained from FTF ACs will be valid and help assessors in VACs; thus, the assessors will not need further experience. In exercises with a low degree of similarity between FTF ACs and VACs (standing exercise), assessors will not be able to draw upon previous experience when making their evaluations, and will need to learn from experience in VACs how to assess these exercises.

 *Hypothesis 4:* The extent to which assessors’ confidence in providing assessments in a VAC improves will vary according to the type of exercise conducted, such that the improvement will be smaller from seated exercises than from standing exercises.

**Methodology**

*Participants and Procedure*
 In this field study, participants comprised 53 individuals who held the role of assessor within ACs at a large selection institute. After elimination of 12 assessors with experience only in VACs and without experience of FTF ACs, 41 participants remained in the final sample. Participants were all graduates of a military diagnostician position or students in the social sciences, in the age range 22 to 36 (*M* = 27.40, *SD* = 2.92). All had experience in assessment at both FTF ACs and VACs. The data were collected after the questionnaire had been sent to all assessors. They were invited to participate in the study voluntarily, and were assured that the information would be used for research purposes only.

 The questionnaire was administered twice, at five-month intervals, in order to examine whether there had been any change in the assessors’ level of confidence over time as they gained more experience with VACs. The level of confidence was examined at two time points: the first at 1–3 weeks after they began a VAC, when all assessors had little experience in virtual assessment, and the second after they had been conducting VACs for about five months, at which point they were considered to have extensive experience in virtual assessment. The study was approved by the Ethics Committee (385/20).

*Description of Selection via Virtual and Face-to-Face Assessment Centers*
 A few weeks before selection day, candidates for military service received a summons with information about the selection process, in which they were asked to confirm their participation. The the type of selection procedure was affected by the timing of the outbreak of the COVID-19 epidemic, which led to transfer from FTF ACs prior to March 2020 to VACs after this time. Each group included two assessors and six candidates in a VAC, and eight candidates in a FTF AC. The selection day included two group exercises and one individual exercise, on which the analysis in this study focuses, as well as the completion of computerized cognitive tests. In the FTF AC, the two parts were performed at the selection site in the presence of other candidates and assessors. In the VAC, the candidates took part in the process from their own location; thus, they were physically distant from each other and did not meet at all. The candidates performed the tests independently on a dedicated computer platform, and the exercises via synchronous VC. The VC was based on Zoom software, and candidates and assessors were required to connect to the conference from a stationary or mobile computer (not via smartphone). The webcam was placed on the computer monitor so that each participant’s head and torso could be clearly seen and all participants could hear each other clearly.

 During the VAC, three exercises were performed that lasted about three hours in total. One exercise was performed in a seated position in both the FTF AC and the VAC. This exercise examined interpersonal sensitivity and involved two role-plays (e.g., teacher and student or seller and customer); each role was different for each candidate and entailed a one-on-one conversation with the assessor, with the assessor taking on the second role in the role-play. As part of the role-play, a variety of candidate abilities relevant to interpersonal communication could be seen; for example, the degree of sensitivity and empathy.

 The other two exercises were standing exercises, such that they were performed while the candidates were standing and moving around the room in the FTF AC but seated during the VAC. The first exercise was a group exercise that examined teamwork ability and leadership. The exercise included several tasks in a sequence that participants were required to perform as a group (e.g., group debate or preparation of a product as a group). In order to perform the tasks, the participants were required to cooperate with each other and work together.

 The second standing exercise was an oral presentation that examined the candidates’ instructional ability. In this exercise each candidate delivered a short lecture to the group. In the FTF AC the candidate physically stood in front of the group and delivered the lecture, while in the VAC they delivered the lecture in a seated position. As part of the exercise, the candidate expressed their abilities relevant to instruction, such as their ability to express themselves orally, adjust content as needed, and create interest among participants. After each of the three exercises, the assessors filled out an assessment form for the candidates and assessed their relevant abilities for each exercise, according to a scale ranging from 1 (= very low ability) to 5 (= very high ability) (see Table 1).

**Table 1**: Dimensions and exercises conducted during the assessment centers

|  |  |  |
| --- | --- | --- |
| Seated exercises | Standing exercises |  |
| Role-play | Oralpresentation | Groupexercise | ExercisesDimensions |
|  |  | X | Teamwork skills |
|  |  | X | Leadership skills |
|  | X |  | Presentation skills |
| X |  |  | Interpersonal sensitivity |

*Measures*

 **Assessors’ level of confidence questionnaire**: In the absence of an appropriate questionnaire that fit the study, a new questionnaire was developed to evaluate the assessors’ level of confidence (Cronbach’s alpha reliability = 0.743). The questionnaire asked them to rate each of the three exercises in the AC according to two aspects: (1) the level of success of the assessment: “To what extent do you feel you were successful in assessing the candidates’ abilities?” and (2) the assessors’ level of confidence in the assessment: “How confident did you feel in the grade you gave?” The scale ranged from 1–5 (1 = virtual selection was not as good as FTF selection, 3 = virtual selection was equal to FTF selection, 5 = virtual selection was better than FTF selection). The questionnaire included a written explanation of its purpose and duration. As noted above, the questionnaire was delivered at two time points: one when the assessors had just begun using VACs and the other after about five months of using VACs.

**Results**

*Analysis of the Assessors’ Level of Confidence*

 In the first stage, the relationships between the assessors’ level of confidence and their level of success in assessing each exercise were calculated. According to Cohen (1988), an *r* value of 0.1 indicates a small effect size, 0.3 a medium effect size, and 0.5 a large effect size. In this study the relationships found at the first time point, when the assessors had little experience, indicated a high effect size: for the group exercise *r* = 0.534, *p* < 0.01; for the topic presentation exercise *r* = 0.628, *p* < 0.01; and for the role-play exercise *r* = 0.768, *p* <0.01. The relationships found at the second time point, when the assessors had extensive experience, were medium to high: for the group exercise *r* = 0.44, *p* < 0.01; for the topic presentation exercise *r* = 0.581, *p* < 0.01; and for the role-playing exercise *r* = 0.632, *p* < 0.01. These medium–high relationships allowed us to calculate a new measure called the “assessors’ level of confidence,” which comprises the mean of the level of success and the level of confidence in the assessment for each of the three exercises at the two time points. Table 2 shows the means and the standard deviations of the assessors’ level of confidence towards each of the three exercises separately, and for all three together, at the two time points.

 Hypothesis 1 suggested that assessors would feel less confident in providing assessments in a VAC than in a FTF AC. The results presented in Table 2 demonstrate that the assessors indeed reported lower confidence in their VAC than in their FTF AC evaluations, as values are less than 3 (the mid-point of the scale, as detailed above) for all reports. In other words, in all instances the assessors, regardless of their experience and the exercise in question, reported that they were less confident providing assessments in VAC than in FTF AC. In order to test whether these results were significant, a one-sample *t*-test was performed that compared the assessors’ level of confidence, regardless of their experience and the exercise, to a value of 3 (wherein the VAC was equal to the FTF AC). The analysis revealed that the assessors’ level of confidence in their evaluation in a VAC was lower than that in a FTF AC (*t*(52) = 10.890, *p* < .001).

 In order to examine Hypotheses 2, which posited that the level of confidence in providing assessments in a VAC would be higher for seated exercises than for standing exercises, a one way analysis of variance (ANOVA) with repeated measures was performed. The analysis indicated a significant effect (*F*(2, 104) = 41.432, *p* < 0.001). In support of Hypothesis 2, follow-up tests indicated that assessors’ level of confidence in the VAC seated exercise (role-play: *M* = 2.811, *SD* = 0.499) was higher than that in the standing exercises (group exercise: *M* = 2.386, *SD* = 0.510, oral presentation: *M* = 2.084, *SD* = 0.518).

 In order to examine Hypotheses 3, which suggested that the assessors’ level of confidence in providing assessments in a VAC would improve as they gained more experience, a paired-samples *t*-test was performed. The analysis revealed a significant effect (*t*(40) = 2.795, *p* < 0.01). In support of Hypothesis 3, the assessors’ level of confidence in providing assessments when they had little experience in doing so via VACs (*M* = 2.296, *SD* = 0.429) was found to be lower than when they had more extensive experience (*M* = 2.491, *SD* = 0.408).

 In order to examine Hypotheses 4, which proposed that the improvement in the assessors’ confidence in providing assessments in a VAC would vary according to the type of exercise at hand, a two-way ANOVA with repeated measures (experience and type of exercise) was performed. The analysis found a significant interaction effect (*F*(2, 80) = 3.325, *p* < 0.05), and therefore follow-up tests were performed. The results supported Hypothesis 4, demonstrating that the effect of experience on level of confidence was dependent on the type of exercise. *T*-tests were again performed for the dependent samples and a significant difference was found between evaluations when the assessors had little experience versus extensive experience for the standing exercises only: in the group exercise (*t*(40) = 4.326, *p* < .001), and in the topic presentation exercise (*t*(40) = 2.012, *p* < .05). In contrast, in the seated (role-playing) exercise, no significant difference was found in the assessors’ level of confidence between the two time points regardless of their experience level (*t*(40) = 0.224, *p* > .05). These findings demonstrate that the type of exercise is a boundary condition to the effect of experience on level of confidence. As demonstrated in Figure 1, the assessors’ level of confidence in the standing exercises (group exercise and topic presentation exercise) in the VAC improved as they gained more experience in conducting assessments of this type. In contrast, their level of confidence in the seated (role-playing) exercise in the VAC were similar regardless of experience.

**Table 2**: Averages and standard deviations of the assessors’ confidence level according to the type of exercise and the assessors’ level of experience

|  |  |  |  |
| --- | --- | --- | --- |
| Overall | Extensive experience | Little experience |  |
| *SD* | *M* | *SD* | *M* | *SD* | *M* | Exercise |
| 0.486 | 2.341 | 0.541 | 2.512 | 0.554 | 2.171 | Group exercise |
| 0.500 | 2.048 | 0.626 | 2.159 | 0.539 | 1.939 | Oral presentation |
| 0.457 | 2.792 | 0.534 | 2.805 | 0.612 | 2.780 | Role-play |
| 0.354 | 2.394 | 0.408 | 2.491 | 0.429 | 2.296 | All exercises |

Note: *N* = 4; *M* = Mean; *SD* = Standard Deviation.

**Figure 1**:Averages of the assessors’ confidence level according to the type of exercise and the assessors’ level of experience

Note: *N* = 41

**Discussion**

 The first study examined assessors’ level of confidence in providing assessments in a VAC versus in a FTF AC. The findings show that the assessors felt less confident in their evaluations in the VAC than in a FTF AC. In addition, their level of confidence in the seated exercise )wherein assessors see only candidates’ upper body in both FTF ACs and VACs( was higher than their level of confidence in the standing exercise )wherein they see the entire body in the FTF AC and upper body in the VAC(.

 The literature has highlighted two major differences in assessment between verbal virtual computer-mediated communication and FTF communication: technical problems that exist only in virtual communication (McColl & Michelotti, 2019), and differences in the extent of nonverbal behavior that assessors can observe and the level of visualization of the other person (head and torso only in FTF, versus whole body in virtual communication) (Joshi et al., 2020). It is possible that these two differences contributed to the variations in the assessors’ level of confidence toward the two kinds of ACs and impaired their level of confidence in evaluation in the VAC. The assessors’ level of confidence toward the seated exercise was higher compared to the standing exercise in the VAC. Thus, it seems that the way the exercise is delivered (sitting or standing) affects the extent of nonverbal behavior to which the assessor is exposed in a VAC versus a FTF AC. In a standing exercise performed in a FTF AC, such as a topic presentation exercise, the assessor can see all body language and body positioning. When performed as part of a VAC this exercise has to be seated, and therefore the participants’ ability to convey, and assessors’ ability to observe, nonverbal cues and behavior is significantly reduced. This may explain the low level of confidence assessors had in their assessments in the VAC compared to the FTF AC. In contrast, with regard to the FTF AC exercise performed in a seated position, wherein the assessors were exposed to the upper body only, there was probably little reduction in the assessors’ information about the candidate in the VAC as it was also performed in a seated position. Hence, when less information is lost in the transition from FTF communication to virtual communication, there is less damage to the confidence of the assessors.

 In terms of the effect of the assessors’ experience on their level of confidence, experience impacted the level of confidence primarily for the standing exercises. The level of confidence was low when the assessors had little experience, but increased for these exercises over time as they gained experience in virtual assessment. Only in the seated (role-playing) exercise did the assessors’ level of confidence fail to improve with more experience in virtual assessment. This is likely because the assessors already had experience in similar exercises from FTF ACs, so there was no benefit from the experience they gained in VAC. The lack of improvement may also be due to the assessors’ high levels of confidence even in assessments with which they had little experience in VACs; that is, it seems that a “ceiling effect” was created, following which it was difficult to see further improvement over time with more experience in virtual assessment.

 Practitioners can apply the findings of this research to planning which exercises to conduct in VACs. The findings also point to the need for training assessors on how to evaluate nonverbal behaviors during VACs. Such training and exercises are necessary to increase assessors’ confidence in their evaluations.

 Study 1 is subject to two main limitations: first, we used a relatively small number of participants (41); second, we conducted the study during a unique period—that is, at the height of the COVID-19 pandemic. Due to guidelines prohibiting gatherings during the pandemic, the assessors were forced to work from home and could not be physically present at the selection site to carry out FTF ACs as they usually would. It is possible that this change, and other characteristics of the period, which was saturated with pressures and a sense of uncertainty, had an indirect effect on the reactions of the assessors. Given the lack of research and empirical evidence regarding VAC, it is clear that more studies are needed to replicate the first step taken in the current research. Future research should aim to collect more data in order to understand the effectiveness of VACs.

 In Study 2, we focus on the fairness perceptions of candidates toward VACs in comparison to FTF ACs.

**Study 2: Candidates’ Perceptions of Fairness in Virtual Assessment Centers**

***Candidates’ Reactions to Selection Processes***

 Beyond understanding the selection processes from the organization’s point of view, researchers have also emphasized the need to understand the candidates’ point of view. Literature on candidate responses developed in the 1980s and has gained momentum in recent years (McCarthy et al., 2017). Candidates’ responses to selection can explain elements of their motivation during selection (Visser & Schaap, 2017) and even their performance during the selection process (Hausknecht et. al., 2004). This is based on the idea that it is not only organizations that select employees but also employees that choose which organization they want to work for (Anderson et al., 2004; McCarthy et al., 2017; Truxillo et al., 2018).

 The term “reaction” in this context refers to the candidate’s position on, influence over, or recognition of a process (Chapman et al., 2003). Most research on candidates’ reactions in the field of selection has focused on how candidates perceive and respond to various selection methods (e.g., interviews or tests) (Ployhart, 2006) with an emphasis on fairness in selection processes (Gilliland, 1993). Candidates that have positive responses to the selection process tend to view the organization more positively, be more willing to accept a job offer, and be more likely to recommend the employer to others (Hausknecht et al., 2004). Candidates who perceive the selection process as unfair are likely to develop negative attitudes toward the organization, and may even cease their participation in the selection process (Smither et al., 1996).

 Web-based selection formats may influence candidates’ responses in specific ways (Konradt et al., 2013). Due to the acceleration in the rate of technology development in recent years, a number of studies have examined responses to video-based virtual interviews (Blacksmith et al., 2016; Chapman et al., 2003; Proost et. al., 2020; Sears et al., 2013; Straus et al., 2001; Toldi, 2011). However, despite the revolutionary changes in personnel recruitment and selection technologies in recent years, and the great scientific interest in how these technologies affect the responses of candidates (McCarthy et al., 2017), no research has yet been conducted on responses towards VACs. In the absence of this type of research, we examine the findings of studies on responses to video-based interviews in order to determine possible responses to VACs.

 A review of relevant studies suggests that there are inconsistent trends regarding video-based interviews. While some studies have found that candidates prefer FTF interviews over video-based interviews (Blacksmith et al., 2016; Chapman et al., 2003; Proost et. al., 2020; Sears et al., 2013; Straus et al., 2001), other studies have indicated that candidates prefer the use of video interviews in the selection process (Ployhart & Ryan, 1997; Toldi, 2011). Video interviews have been perceived as more effective and innovative compared to traditional FTF selection processes (Toldi, 2011).

 The present study examines the responses of candidates toward a video-based AC. It also compares these responses to those toward FTF ACs, following the call by Anderson (2003) for such comparisons. Study 2 is based on a natural design with real candidates; this enables us to examine the responses of candidates for whom selection has real employment implications (Truxillo et al., 2002), which may differ from responses of those participating in selection only for the benefit of the study.

***Fairness in a Virtual Assessment Center***

 The main theoretical basis of most research in the field of candidates’ responses to selection processes is Gilliland’s (1993) model of procedural justice, which relates to the fairness of selection processes. According to this model the question that candidates ask regarding the selection process is “Was it fair?” Their responses to the selection process are influenced by the answer. The model includes 10 procedural rules of justice associated with three categories: (1) formal characteristics of the selection, including job-relatedness, chance to perform, consistency, and reconsideration opportunity; (2) feedback, information knowledge, and openness; and (3) interpersonal treatment, including two-way communication, treatment, and propriety of questions. Perceptions about the extent to which each of the rules is met or violated in the selection process are combined to create an overall assessment of fairness in the selection process (Gilliland, 1993).

 In order to deepen our understanding of whether and why candidates’ responses to FTF ACs differ from those to VACs, we examine the extent to which these rules of justice are applied to a VAC compared to a FTF AC. This examination reveals that the rules of justice are applied to a similar extent between these two ACs. For most rules of justice there is no difference in their application between FTF ACs and VACs: in terms of consistency, which is defined as a standardization of the process so that each candidate performs the selection process in the same way (Truxillo et al. 2018), there is a similarity between two ACs. All candidates in the group were assessed at the selection site or all candidates in the group were assessed remotely, depending on the group. There was no situation in which some candidates were assessed via a FTF AC while others in the same group were assessed remotely.

 In terms of job relevance, which is defined as the degree to which the selection process is relevant to the job for which the selection is intended (Truxillo et al., 2018), because the AC in our study examines candidates’ suitability for a variety of roles the online setting is more suitable for some positions, and the FTF setting for others. In addition, the technological knowledge and experience required in a VAC may be relevant for some of the roles to which candidates are applying. Therefore, in an AC of this type, which examines suitability for a variety of roles with diverse work environments, it is assumed that perceptions of fairness will be similar for both the FTF AC and the VAC.

 In terms of the opportunity to perform, which is defined as the ability to express a person’s true abilities (Truxillo et al., 2018), extant findings are inconsistent. Some studies have claimed that video-based selection properties, in which nonverbal cues are difficult to transmit through the computer, reduce the likelihood of a candidate expressing their abilities and therefore give rise to adverse reactions (e.g., Straus et al., 2001). On the other hand, other studies have found that candidates feel they are more able to express themselves in video interviews (Toldi, 2011). It is also possible that the young population that comprised the sample for this study feels more natural and more comfortable in the online environment and therefore can express themselves more effectively in it. Hence, the extent to which candidates feel they can express themselves probably depends on the characteristics of the individual, as some will feel that a FTF AC is fairer, and others a VAC. It is hypothesized that candidates’ ability to express themselves is similar in both AC formats.

 In terms of explanation, there were no differences in the organizational processes in this context between the FTF AC and the VAC. The amount and manner of information and feedback in these two ACs was similar, so in this context it is assumed that perceptions of fairness toward the two AC types will be similar. In terms of communication between candidates and assessors and the extent to which assessors treat candidates with warmth and respect, and are fair in their questions (Truxillo et al., 2018), similar results were found between the two ACs. In the VAC candidates may experience a greater sense of distance due to the screen and the lack of physical contact; however, in the VAC the number of candidates in each group is smaller than in the FTF AC. In each VAC group there are two regular assessors who accompany the candidates throughout the selection process (as opposed to alternating assessors in the FTF AC). Therefore, it is assumed that in general the attitude of the assessors toward candidates will remain similar. In addition, the questions and instructions for different exercises are comparable between the two AC formats. Therefore, there seems to be similarity in the way the rules of justice are applied (Gilliland, 1993). The VAC in this study was developed accordingly and maintained the same principles in terms of fairness as the FTF AC, so it is assumed that there will be no difference in the perception of fairness between the two AC formats.

 *Hypothesis 5:* Candidates’ perception of fairness toward the VAC will be similar to that toward the FTF AC.

**Methodology**

*Participants and Procedure*

 The participants in this field study comprised candidates in an AC for a variety of positions in the army. All participants were women (the position in question was open to women only) in the age range 16.2 to 24.5 (*M* = 17.3, *SD* = 0.5). Of the respondents, 779 took part in a FTF AC, and 3,983 participated in a VAC based on synchronous VC. The the type of selection procedure was affected by the timing of the outbreak of the COVID-19 epidemic, which led to transfer from FTF ACs to VACs (as per Study 1). At the end of the AC, the candidates completed a process justice perception questionnaire regarding the AC in which they had taken part (FTF AC or VAC). While the candidates in the FTF AC completed the questionnaires using paper and pencil at the selection site, candidates in the VAC did so via computer. The questionnaires were completed by both groups before the candidates received feedback on the AC in which they had participated. In the two ACs, the candidates were assured that the use of information from the questionnaires would be for research purposes only and would not affect hiring decisions. The study was approved by the Ethics Committee (385/20).

*Description of Selection in the Assessment Centers*

 At the FTF AC, the candidates arrived at the selection site where they performed computerized tests and exercises in a group setting, with other candidates. In each exercise two assessors assigned to the specific exercise were present (different assessors for each exercise). In the VAC the candidates performed the tests remotely (mostly from home) and the group exercises were conducted via synchronous VC with additional candidates and two assessors who also connected remotely, without physically meeting with each other. The same two assessors evaluated all exercises in the VAC (for more information on the method, see information on Study 1).

*Measures*
 **Candidates’ perception of fairness questionnaire**: The questionnaire allowed the organization to examine how fair its selection processes were perceived to be by candidates (Bauer et al., 2001). The questionnaire was based on the Selection Procedural Justice Scale (SPJS) (Bauer et al., 2001) that was developed on the basis of Gilliland’s (1993) organizational justice rules and has served as the basis for a wide range of studies. The questionnaire in this study included 11 of the 39 items developed by Bauer et al. (2001) and had a Cronbach’s alpha coefficient of 0.773. The questionnaire was being conducted during FTF ACs for the benefit of organizational control and learning even before the transition to VACs and the commencement of this research. The original questionnaire was reduced because some questions were not relevant to the selection process or to the timing of the questionnaire transfer (e.g., it was not possible to ask candidates for feedback on their scores as they had not yet seen their scores when filling out the questionnaire). The decision to use this limited version of the questionnaire stemmed from the constraints of field research and the desire to meet the need for research comparing candidates’ responses toward virtual versus traditional selection processes (Anderson, 2003). In order to compare the candidates’ perceptions of fairness regarding the FTF AC versus the the VAC, we decided to use the same questions for the VAC as were already being used for the FTF AC. This decision was also made because the transition to the VAC was sudden due to the constraints of the COVID-19 pandemic and could not be anticipated; thus, we were unable to submit ’sthe full questionnaire in advance. The fact that we used the limited questionnaire in both AC types will enhance the contribution of the study, as using the complete questionnaire in the VAC would have inhibited comparison. Examples of the items used included “I had enough information in advance about the selection format” and “I received fair and considerate treatment during the selection process.” Candidates were asked to answer honestly and to assess their degree of agreement with each item on a 5-point Likert scale (1 = “strongly disagree” to 5 = “strongly agree”).

**Results**

*Candidates’ Perceptions of Fairness*

 Hypothesis 5 suggested that there would be no difference between candidates’ perception of fairness toward the VAC versus the FTF AC. Differences in perceptions of fairness toward the various ACs were examined using Cohen’s *d* (used for comparisons of large groups). Cohen’s *d* values for the perceptions of fairness toward the VAC (*M* = 4.265, *SD* = 0.457) versus the FTF AC (*M* = 4.197, *SD* = 0.585) was *d* = 0.140. This difference is not significant based on Cohen’s (1988) definition of *d* < 0.20 as indicating a lack of effect. Therefore, Hypothesis 5 is supported since there was no difference in perceptions of fairness between the VAC and the FTF AC.

**Discussion**

 It is very important for organizations to understand candidates’ responses to VACs, as these responses affect how organizations plan and execute their selection processes (Anderson & Goltsi, 2006). Consistent with the research hypothesis, we found that the fairness perceptions of candidates toward the VAC were similar to their fairness perceptions toward the FTF AC. However, it is important to note that the present study was conducted on young candidates designated for the rank of private, which is the lowest military ranking. In addition the responses of young candidates who are accustomed to the accessibility and widespread use of mobile phones and the Internet—that is, “digital natives” (Prensky, 2001)—may differ from those of older populations. In order to deepen understanding of perceptions of fairness beyond the specific population in this study, it is thus recommended that future studies examine responses among older populations, or those aiming for more senior positions (Straus et al., 2001). It is possible that candidates who participate in VACs for more senior positions may expect the employer to make more effort in their recruitment and may expect to have personal contact such as they would receive FTF as opposed to via VC (Chapman et al., 2003). For example, an organization that conducts interviews via phone may convey that they assign a low level of value on potential employees compared to an organization that invests time, effort, and expense in conducting FTF interviews (Chapman et al., 2003). In addition, candidates aiming for the rank of private—that is, the lowest rank in the military organization—may have more positive reactions towards a VAC that matched their expectations. It would thus be worthwhile to delve deeper into the question of whether the level of the target position affects candidates’ reactions to a VAC.

 Beyond the limitations related to population characteristics, it is important to note that the study was based on data from an AC conducted at two different time points, wherein all candidates in each individual group performed the same type of AC (that is, all the candidates before the COVID-19 pandemic outbreak took part in a FTF AC together, and all those after the outbreak took part in a VAC). Thus, we did not examine a situation in which candidates aiming for the same position participated in different AC formats (some FTF AC and others VAC). It is therefore recommended that further studies examine the fairness perceptions of candidates in such combined situations.

**General Discussion**

 The purpose of this study was to examine a new selection tool, the VAC, by comparing the perceptions of candidates and assessors toward it versus FTF ACs. The need to examine this new selection tool arose from the revolutionary changes in recruitment and selection technologies as organizations sought to deal with limitations due to the COVID-19 pandemic (Jones & Abdelfattah, 2020; Joshi et al., 2020), which expanded the use of VACs for selection purposes. It was found that using a VAC, along with the organizational benefits of saving time and money and expanding the scope of relevant candidates (Chapman & Webster, 2001, 2003), produces similar perceptions of fairness as for FTF ACs among candidates. However, the assessors’ level of confidence was higher for the FTF selection tool compared to the virtual selection tool.

 These findings present, for the first-time, empirical evidence on candidates’ and assessors’ perceptions towards VACs, and thus make a significant contribution to organizations that want to understand the implications of running VACs instead of FTF ACs. The findings can be used to help professionals in occupational-organizational psychology and HR make decisions about how to implement VACs. For example, based on the findings, organizations operating VACs are advised to invest in in-depth training on the running of VACs for assessors to strengthen their level of confidence in providing evaluations. It also appears that selection tools that are primarily based on the transmission of verbal information, and do not require candidates to move around the room and communicate using their body, are particularly suitable for execution within VACs. Beyond these findings, in order to understand the complete picture of this new form of AC, it is necessary to delve deeper and examine whether there are differences in the assessment characteristics and validity of VACs compared to FTF ACs.

 The current study provides the first step in building a body of research regarding VACs. It presents an empirical comparison of assessors’ and candidates’ responses to VACs in comparison to FTF ACs. We hope that future research will extend this and seek to fill the remaining research gaps regarding this topic. Future studies should not only replicate comparisons made in the current study using an older population, and outside of the unique COVID-19 pandemic period, but also test differences in the actual assessments provided in VACs in comparison to FTF ACs (concurrent validity), examine the ability of VACs to predict role performance (predictive validity), and explore the level of reliability of assessments in VACs compared to FTF ACs.

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