Development and validation of the Rapport-Pro for investigative information-gathering contexts

Celine Brouillard, Fiona Gabbert and Adrian J. Scott

Abstract

Purpose – *This paper aims to present the development and validation of a new measure of rapport designed specifically for measuring attempts to build rapport in professional information-gathering contexts.*

Design/methodology/approach – *Guided by best practice recommendations and informed by a systematic review, the development of the "Rapport-Pro" followed three initial phases: (i) construct identification and item generation, (ii) pretesting and face validity assessment and (iii) expert evaluation and content validity. Following established scale development standards, two online studies examined the psychometric properties of the Rapport-Pro, considering its accuracy and appropriateness in measuring rapport in professional contexts.*

Findings – *Study 1 (*n *= 172) included the three initial development phases and a confirmatory factor analysis, which supported a second-order model where five rapport components loaded onto a higher-order rapport factor. Item response theory analysis further confirmed item discriminability and the reliability of the Rapport-Pro. Study 2 (*n *= 399) sought to replicate the findings from Study 1, suggesting good factorial and concurrent validity, while also examining construct validity by assessing the Rapport-Pro's alignment with related constructs such as "active listening," "trust" and "expertise" through convergent and discriminant validity checks. The successful replication of evidence supporting factorial and concurrent validity from Study 1 attests to the stability and effectiveness of the Rapport-Pro in detecting variations in rapport.*

Originality/value – *With evidence of factorial, construct, face, content and concurrent validity, the Rapport-Pro addresses theoretical gaps and practical needs, emerging as a robust instrument for assessing professional rapport and enhancing official guidelines, training and practice of rapport-building strategies.*

Keywords *Policing, Assessment*

Paper type *Research paper*

Introduction

Building rapport in professional information-gathering contexts, such as police interviews with witnesses and suspects, has repeatedly been found to foster a noncoercive environment that encourages cooperation and information disclosure (Brimbal *et al.*, 2021; Gabbert *et al.*, 2021). However, for the past decade, scholars have consistently voiced concerns that the definition and operationalization of rapport remains vague and varies between researchers (Gabbert *et al.*, 2021; Neequaye and Mac Giolla, 2022; Richardson and Nash, 2022; Sauerland *et al.*, 2018; Saywitz *et al.*, 2015; Vanderhallen and Vervaeke, 2014; Vallano and Schreiber Compo, 2015). In a recent review of 228 papers examining the use of the term rapport in the investigative interviewing literature, Neequaye and Mac Giolla (2022) reported that 32 explicitly defined rapport, resulting in a total of 22 different definitions. The researchers highlighted how these inconsistencies impede empirical assessments of rapport and called for a collaborative effort to determine what constitutes rapport and agree upon a working definition of rapport.

Celine Brouillard is based at University of Greenwich, London, UK, and Goldsmiths University of London, London, UK. Fiona Gabbert and Adrian J. Scott are both based at Goldsmiths University of London, London, UK.

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Two recent systematic reviews further illustrate the problem of differing notions of what constitutes rapport as it is used in professional settings. First, Gabbert *et al.* (2021) examined verbal, nonverbal and paraverbal behaviors used to build and measure rapport in professional contexts, again finding little consensus between researchers. Various disparate measurement techniques were found to have been used by researchers to quantify rapport, with only one instance where a research team adopted a rapport measure previously used by another team (Oostinga *et al.*, 2018). This lack of consistency is presumably a consequence of the various definitions of rapport, whereby rapport is trained and measured according to the definition selected.

More recently, Brouillard *et al.*'s (2024) systematic review highlighted discrepancies between measures of rapport in relation to theoretical underpinning, scale development, validity and reliability testing. Only one measure of rapport – Duke *et al.*'s (2018) "Rapport Scales for Investigative Interviews and Interrogation, Interviewee Version" (RS3i) – had been validated in accordance with (some of) the methodological recommendations relating to best practice scale development (see Brouillard *et al.*, 2024, for an evaluation of the strengths and weaknesses of existing measures). Such limited consistency across studies in the way rapport is both defined and measured creates clear challenges for policy and practice, such as developing effective evidence-based guidelines for the training and assessment of rapport as it is used in professional settings. Brouillard and colleagues concluded their systematic review by recommending that researchers consult standards in scale development and validation, again highlighting the need for the development of a comprehensive and reliable measure of rapport.

The goal of the current research is, therefore, to develop and validate a new measure of rapport for use in professional contexts. However, as mentioned earlier, the absence of a universally accepted definition of rapport poses a significant challenge during the initial phases of scale development. Given the context of interest, namely, professional (cf. social) contexts, Gabbert *et al.*'s (2021) concept of "professional rapport" is fitting. This refers to "an intentional use of rapport behaviors in an attempt to facilitate a positive interaction with another person that might or might not lead to establishing genuine rapport" (Gabbert *et al.*, 2021, p. 330). We argue that this understanding of rapport is useful because there are clear differences in the way in which rapport is understood in professional and social contexts. For example, in social settings, mutual rapport can develop naturally over time, often through uncovering shared experiences, interests and values as individuals are free to interact and get to know each other as equals (Oxburgh *et al.*, 2023). In contrast, professional interactions are often more deliberate, with one person actively working to establish rapport, usually within a limited timeframe. These situations frequently involve differences in power or status, with interviewers holding authority and controlling the information exchange (Powell *et al.*, 2005). Interviewees might have varying levels of motivation to engage and different goals for the interaction (Oxburgh *et al.*, 2023). For example, frontline police officers encounter numerous individuals in each shift, often needing to work to establish trust and rapport quickly to facilitate the goal of the interaction (information gathering), but with no requirement to establish genuine mutual rapport between both parties. We argue that differentiating between naturally occurring "mutual rapport" and intentionally constructed "professional rapport" can provide valuable insights for professionals who need to foster rapport in their work. Accordingly, we propose a slight adjustment to Gabbert *et al.*'s (2021) definition of professional rapport by replacing the term "rapport behaviours" with the more specific terms "interpersonal skills and behaviours." The revised definition now states: "an intentional use of interpersonal skills and behaviors in an attempt to facilitate a positive interaction with another person that might or might not lead to establishing genuine rapport."

Across 35 studies, Gabbert *et al.*'s systematic review sought to identify and collate the most frequently used verbal, nonverbal and paraverbal behaviors used by researchers and

practitioners to develop professional rapport. Subsequently, the researchers considered the underlying intention of each of the behaviors and used this to group rapport behaviors in relation to the goal served, namely, (i) personalizing an interview/interaction, (ii) presenting an approachable demeanor and (iii) paying attention. This understanding of key components most frequently used to develop rapport serves as a promising starting point for identifying relevant items for a new measure of professional rapport. Building on this work, Brouillard *et al.*'s (2024) systematic review examined items from existing measures of rapport used in professional contexts and added a further two components, (iv) being professional/nonjudgmental and (v) establishing a mutual connection (while also confirming the original three components from Gabbert *et al.*'s review). Together, this work provides a strong foundation for generating an item pool for the development of a new and robust rapport measure tailored for professional contexts.

In sum, the goal of the current paper is to use both quantitative and qualitative approaches to develop and test a new measure of professional rapport, the Rapport-Pro, in line with methodological recommendations in scale development and validation (e.g. Boateng *et al.*, 2018; Linn, 2011). The measure's psychometric properties and validity evaluation are explored with the aim of providing evidence for the factorial structure, reliability, discriminability, as well as concurrent and construct validity of the Rapport-Pro. Unlike prior measures, the Rapport-Pro integrates a multi-faceted approach, grounded in current literature, that captures key components generally agreed to relate to rapport as used in professional (cf. social) contexts. Considering that all international best practice interview guidelines underscore the critical role of rapport in eliciting quality information (Achieving Best Evidence, Ministry of Justice, 2011; Army Field Manual, Department of the Army, 2006; College of Policing, 2022; Cognitive Interview, Fisher and Geiselman, 1992; NICHD Protocol, Lamb *et al.*, 2007; PEACE model, CPTU, 1992), the development of the Rapport-Pro could become an essential tool that facilitates the development of evidence-based guidelines and training programs, promoting consistent and effective rapport-building practices, as well as advancing an understanding of rapport in a different (professional) context.

Study 1: Development and evaluation of the Rapport-Pro

The purpose of Study 1 was to develop a measure of rapport following best practice recommendations and incorporating suggestions from Brouillard *et al.* (2024). The development of the Rapport-Pro was further refined by evaluating its psychometric properties and concurrent validity. This study details the initial evaluation of the Rapport-Pro, including item reduction, factor extraction, dimensionality testing and reliability assessment (Boateng *et al.*, 2018; DeVellis and Thorpe, 2021). Additionally, item response theory (IRT) is applied to demonstrate the discriminability and accuracy of the Rapport-Pro.

Method

Participants

An *a priori* sample size of 500 data points (from a total of approximately 165 participants) was selected based on Tabachnick and Fidell's (2014) recommendation that factorial analysis requires between 200 and 500 data points. The larger target was deemed appropriate for assessing the reliability of a new measure and its factorial structure. A total of 223 participants took part in the online study using Qualtrics, recruited through Prolific (www.prolific.com) and the research SONA system at Goldsmiths, University of London. Participants from Prolific received monetary compensation for their participation, while students from Goldsmiths received research credits. Overall, 51 participants were excluded from the study due to either failing to complete the study ($n = 13$) or failing to correctly answer the two embedded attention checks ($n = 34$). This resulted in a total of 172

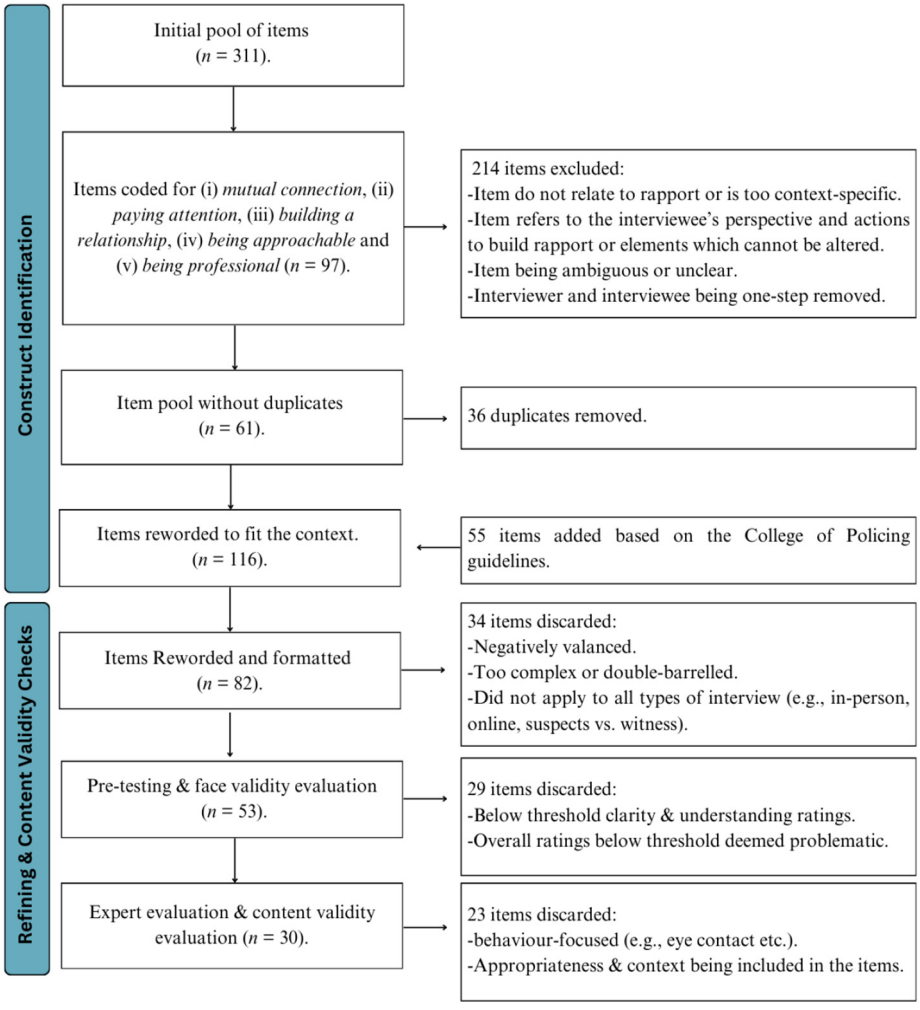
participants who fully completed the study, each of which rated three investigative interviews using videos on YouTube, totaling 516 individual ratings of rapport. Upon inspection of the data, there were seven (random) missing values. These remained in the data set and were dealt with via listwise deletion. As the missing values were not evenly distributed among the variables, the number of usable data points varied slightly across the different analyses, ranging from 510 to 515.

Materials

The Development of the Rapport-Pro [1]: The Rapport-Pro questionnaire was developed based on established and recommended standards in scale development [American Educational Research Association, American Psychological Association and National Council on Measurement Education (AERA, APA, NCME), 2014; Boateng *et al.*, 2018] including three initial development phases. First, the key construct of interest – professional rapport – was defined based on existing measures, theories and reviews of rapport (Abbe and Brandon, 2013, 2014; Gabbert *et al.*, 2021; Neequaye and Mac Giolla, 2022; Tickle-Degnen and Rosenthal, 1990). The existing measures of rapport (identified in Brouillard *et al.*, 2024) were used to generate an item pool of potential questions ($n = 311$). Figure 1 outlines the subsequent steps taken to refine the item pool (e.g. removing duplicates, assessing face validity and rewording for clarity), which resulted in 53 included items. Finally, an expert evaluation was conducted ($n = 12$ academics and practitioners with expertise in the use of rapport in professional contexts) to further refine items where needed (e.g. rewording or deleting ambiguous items) and to verify the content validity of the measure, to confirm the suitability of the Rapport-Pro's theoretical underpinning, structure and items. As a result, the first prototype of the Rapport-Pro was represented by a theoretically driven 30-item measure suitable for further evaluation. The Rapport-Pro evaluates perceptions of rapport in an interaction by considering five main components: *mutual connection* (e.g. there was a natural flow of conversation between the interviewer and interviewee), *paying attention* (e.g. the interviewer was attentive to the interviewee), *building a relationship* (e.g. the interviewer made an effort to understand the interviewee), *being approachable* (e.g. the interviewer encouraged the interviewee to talk) and *being professional* (e.g. the interviewer treated the interviewee fairly). Each item was scored using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), allowing for average ratings to be generated for *professional* rapport *as a whole* and for each of the five components of rapport separately. Before generating average ratings for professional rapport and each of its five components, an initial reliability analysis was conducted to assess internal consistency and interitem correlations (see Results and Table in the Supplementary Materials). Three versions of the measure were developed, assessing perceptions of rapport from different perspectives, the Rapport-Pro: interviewer, interviewee and observer. For this paper, only the Rapport-Pro: observer was used.

Videos: To ensure controlled stimuli, the study used six videos, each showcasing an investigative interview conducted online via Teams. The videos were based on mock investigative scenarios to ensure consistent content across all materials. Each video featured a unique interviewer and interviewee to represent a variety of interviewing skills and eliminate potential familiarity effects. Each video lasted approximately 10 min and was recorded as part of a separate investigative interview training program whereby students from Goldsmiths interviewed a peer to develop their interviewing skills (Gabbert *et al.*, 2025). Of the six video interviews, two were recorded before attending any training (baseline performance) and four were recorded after attending training sessions. Importantly, six independent coders rated their perceptions of rapport in each of the interviews using a single seven-point Likert scale (1 = low perceived rapport; 7 = high perceived rapport). High agreement among the coders was indicated by Intraclass Correlations Coefficients (ICC = 0.95, 95% CI [0.83, 0.99]). Mean rapport ratings were then

Figure 1 Development process of the Rapport-Pro with included and excluded items at each stage of development



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used to categorize the interviews into three levels: low (around 1), moderate (between 2 and 3) or high (between 6 and 7) levels of rapport. To expose participants to varying levels of rapport, they were randomly assigned to one of two sets of videos, each containing three interviews that represented low, moderate and high rapport levels. This approach helped mitigate potential biases arising from video selection or quality.

Procedure

Participants could access the study through an anonymous link shared either on Prolific or on the research SONA system at Goldsmiths. Upon accessing the study, participants were presented with information about the study, including an outline of the objectives and general procedure. Those who consented to participate were randomly allocated to a set of three videos, each representing varying levels of rapport between an interviewer and interviewee (low, moderate and high). The order of the videos was randomized to prevent order effects. Participants watched each video in full and completed the Rapport-Pro

questionnaire immediately afterward (i.e. they watched the first video and rated rapport, then repeated this process for the second and third videos in their set). To prevent participants from skipping the video without watching in full, the function to delay skipping forward was used within Qualtrics. Once all three videos had been watched and rated, participants were thanked for their time and presented with a debrief statement. Overall, the study lasted approximately 45 min. Two attention check questions were administered at different points during the survey to ensure participants' engagement. These attention checks were formatted according to Prolific's guidelines (see Supplementary Materials). Participants were informed that the failure to pass both attention checks would result in their participation being rejected, as advised by Prolific (2024).

Transparency and openness

The resources used for this study, including the data sets, materials, history of the measure development and full versions of the Rapport-Pro, are all freely available on the open science framework (OSF; https://osf.io/tkqx6/?view_only=276c09ea860643559ab4068c3b5f1457). This study was not preregistered. Ethical approval was granted by the Goldsmiths' Ethics Committee.

Results

The data were modeled using confirmatory factor analysis (CFA) on SPSS AMOS 27 Graphics. The items' contributions to the Rapport-Pro were also examined by assessing the measure's internal consistency and conducting IRT using SPSS Statistics 28 and the graded response model plugins of the packages LTM: an R Package for latent variable modeling for IRT analyses (Rizopoulos, 2007). For clarity, items are labeled by component and their order in the measure (e.g. *mutual connection* = MC, *paying attention* = PA).

Model fit

Items' contribution

In an initial step, a reliability analysis was conducted on each component of rapport to assess the interitem and item-total values of the measure. The internal consistency for the scale was excellent. However, an inspection of the individual components of rapport indicated the reliability would increase slightly if four items were deleted. Taking into consideration that scales with many items tend to be more reliable with higher alpha values (DeVellis and Thorpe, 2021) and that redundancy of items within subscales can be problematic, a decision was made to remove four items from the measure, resulting in a 26-item solution (alpha = 0.9; see Table Supplementary Materials for the reliabilities of each component of rapport).

Confirmatory factor analysis

To evaluate the goodness of fit of the Rapport-Pro, a CFA was conducted using a maximum likelihood estimate on 510 ratings into a five-factor solution including the 26 items loading either o*n mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional*. The results of the CFA are shown in Table 1. The Chi-square goodness of fit was considered unreliable as it is particularly sensitive to sample size and cannot always be a trusted indicator of model fit (Byrne, 2010). Therefore, four other indices were considered. First, the root mean square error of approximation (RMSEA) is a popular index to assess goodness of fit and a value close to zero indicates a close fit. Values larger than zero, reaching 0.05 (Browne and Cudeck, 1993) or 0.06 (Hu and Bentler, 1999) are deemed good and acceptable, respectively. Others argue that a value of 0.08 or less can be considered a fair fit (see MacCallum *et al.*, 1996). Because RMSEA is influenced by

Table 1 Goodness-of-fit statistics and comparisons between the three models of professional rapport

Models	*χ2*	*Df*	*χ2/df*	*CFI*	*TLI*	*SRMR*	*RMSEA*	*RMSEA 95% CI*	*ECVI*	*PNFI*	*Δχ2*
Model 1a	946.71	289	3.28	0.96	0.96	0.024	0.067	0.062–0.072	2.21	0.84	
Model 1b	761.98	286	2.70	0.97	0.97	0.020	0.057	0.052–0.062	1.86	0.84	
Model 2	784.37	291	2.70	0.97	0.97	0.020	0.058	0.053–0.063	1.88	0.86	
Model 3	917.77	296	3.10	0.97	0.96	0.018	0.064	0.060–0.069	2.12	0.86	
Model 1–Model 2											22.39*
Model 1–Model 3											155.79*

Note(s): Model 1a = five-factor correlated models including 26 items; Model 1b = five-factor correlated models including 26 items including correlation paths; Model 2 = second-order model; Model 3 = unidimensional models *$p > 0.05$
Source(s): Authors' own work

sampling variation, it is recommended to consider and report 95% confidence intervals rather than a single estimate (Browne and Cudeck, 1993). Second, the standardized root mean square residual (SRMR), which, unlike RMSEA, is independent of the complexity of the model (Schuberth *et al.*, 2023). Again, the model is a close fit when the SRMR value approaches zero, but cut-off values of 0.05 (Sivo *et al.*, 2006) or 0.08 (Hu and Bentler, 1999) are recommended. Third, the comparative fit index (CFI), which compares the proposed model with an independent model where the observed variables are uncorrelated, should be considered (Byrne, 2006). The higher values of CFI are indicative of a better model fit with a value of 0.90, an acceptable model fit and 0.95, a good model fit (Hu and Bentler, 1999). Fourth, the Tucker–Lewis index (TLI), another index commonly used to compare model fit, can be interpreted similarly to CFI; a good model fit is demonstrated by the estimate approaching one. While the interpretation of goodness-of-fit can be selected subjectively, most indices implying a good model fit usually reflect a reliable and conservative evaluation of model fit (Schreiber *et al.*, 2006). Please refer to Table 1 for the goodness of fit statistics for each statistical model.

The results of the CFA suggested Model 1a was an appropriate fit (RMSEA = 0.067, 95% CI [0.062, 0.072], SRMR = 0.024, CFI = 0.96, TLI = 0.96). The parameter estimates were then examined and all found to be significant, further signifying a good-fitting model. Potential signs of misspecification were examined according to the standardized residual covariances. Byrne (2010) suggests that larger standardized residuals can indicate potential misspecification between two variables, referring to standardized residuals higher than 2.56 in absolute value as large. Whittaker (2012) suggests further investigations are necessary when standardized residuals are greater than 1.96. The standardized residual covariances and the modification indices highlighted three items that could be problematic, all of which displayed large modification indices and standardized covariances close to or higher than 1.96, with one exceeding the 2.56 threshold.

To address potential model misspecifications, the model was revised by adding three correlation paths. These modifications were theoretically justified, as all three items (BP1, BP2 and BP5) belonged to the *being professional* component, assessing fairness, respect and politeness. Given the shared focus on respect within professional interactions, correlated errors addressed the shared variance among those items while preserving the model's theoretical coherence. The revised model resulted in an appropriate to close model fit (RMSEA = 0.057, 95% CI [0.052, 0.062], SRMR = 0.020, CFI = 0.97, TLI = 0.97). The factor loading of Model 1b, including the remaining 26 items, are presented in Table 2. Therefore, these items were retained and correlated error paths were added to account for shared variance, improving the model's fit.

Despite the close model fit, Model 1b suggested high covariances between the five factors. Considering such overlap, a combination of factors is often recommended. If the fit of the unidimensional model is acceptable, it is usually favored for its improvement in parsimony (Brown and Moore, 2012). As such, two additional models were considered: a unidimensional

Table 2 Standardized factor loadings for the three models of the Rapport-Pro

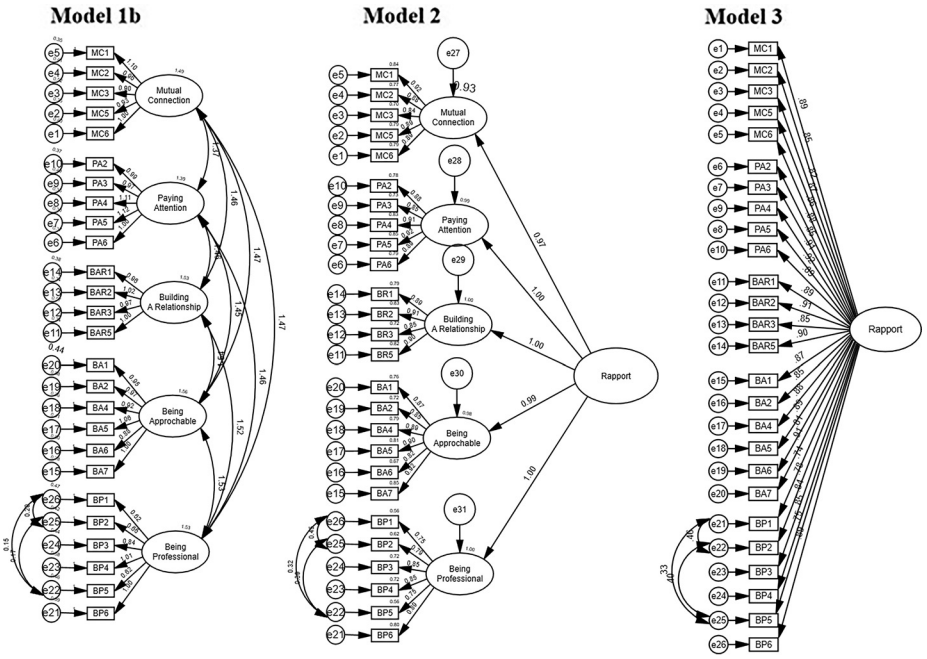
Factors	*Loadings* *Model 1b*	*Model 2*	*Model 3*
Mutual connection			
There was a natural flow of conversation between the interviewer and interviewee (MC1)	0.916	0.916	0.889
The interviewer and interviewee were comfortable in each other's presence (MC2)	0.879	0.878	0.855
The interaction between the interviewer and interviewee was appropriately paced (MC3)	0.835	0.835	0.819
The interviewer and interviewee demonstrated an understanding of one another MC4)	0.888	0.889	0.872
The interviewer and the interviewee demonstrated an interest in one another (MC5)	0.888	0.888	0.864
Paying attention			
The interviewer was attentive to the interviewee (PA1)	0.886	0.885	0.879
The interviewer took the time to consider what the interviewee said (PS2)	0.853	0.853	0.847
The interviewer was appropriately empathetic toward the interviewee (PA3)	0.911	0.911	0.908
The interviewer was engaged with the interviewee (PA4)	0.923	0.923	0.920
The interviewer was responsive to what the interviewee said (PA5)	0.889	0.890	0.887
Building a relationship			
The interviewer made an effort to understand the interviewee (BR1)	0.886	0.887	0.886
The interviewer took an interest in the interviewee (BR2)	0.908	0.909	0.908
The interviewer tried to find common ground with the interviewee (BR3)	0.846	0.846	0.847
The interviewer was sensitive to the wellbeing of the interviewee (BR4)	0.904	0.904	0.903
Being approachable			
The interviewer encouraged the interviewee to talk (BA1)	0.874	0.875	0.867
The interviewer's tone of voice was conversational (BA2)	0.847	0.846	0.846
The interviewer created a safe space for the interviewee to share information (BA3)	0.887	0.887	0.884
The interviewer reassured the interviewee (BA4)	0.901	0.900	0.893
The interviewer had an open body posture (BA5)	0.818	0.819	0.814
The interviewer was supportive of the interviewee (BA6)	0.921	0.921	0.913
Being professional			
The interviewer treated the interviewee fairly (BP1)	0.745	0.745	0.743
The interviewer was respectful toward the interviewee (BP2)	0.787	0.790	0.784
The interviewer was sincere with the interviewee (BP3)	0.843	0.849	0.841
The interviewer was confident when conducting the interview (BP4)	0.855	0.849	0.850
The interviewer was polite toward the interviewee (BP5)	0.749	0.749	0.745
The interviewer adapted their communication to suit the interviewee (BP6)	0.892	0.892	0.892

Source(s): Authors' own work

model of professional rapport (Model 3) and a second-order model (Model 2), including professional rapport as a higher-order factor affecting *mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional* as second-order factors. Similarly to Model 1b, both the unidimensional and second-order models were deemed to be good fits to the data set (see Table 1) and displayed significant factor loadings (see Table 2). All models are represented in Figure 2.

A chi-square test of difference ($\Delta\chi 2$) was then used to compare which of the three models was the best to retain (correlated vs second order, correlated vs unidimensional). Chi-square differences reveal the correlated model is significant across comparisons, indicating its most appropriate fit for the current data set. Thus, the unidimensional model was rejected. Though, the covariances are likely to affect the results of the measure. According to Fabrigar *et al.* (1999), when considering different models, it is more valuable to choose the model "[...] which constitutes a substantial improvement in for over a model with one fewer factor but for which a model with one more factor provides little if any improvement in fit" (p. 279). Despite the significance of Model 1b, the fit indices of Model 1b and Model 2 were very close, suggesting a similar goodness-of-fit while increasing slightly its parsimony-adjusted measures index (PNFI = 0.86). Therefore, the second-order model was retained as it addressed both the goodness of fit and the five-factor covariances.

Figure 2 Three models compared in the CFA using the 26 items of the Rapport-Pro and the revised structure



Source(s): Authors' own work

Items analysis

Reliability

A reliability analysis was conducted again to assess the reliability of the final model including 26 items. The reliability was assessed for the Rapport-Pro as a whole and for the individual second-order components. The results suggest that the Rapport-Pro presents excellent internal consistency overall and across components of rapport (alpha $>$ 0.9; see Supplementary Materials for more details on the reliabilities for each component of rapport).

Item response theory

The contribution of each item to the higher-order latent variable (rapport) and second-order variables (*mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional*) was evaluated using discrimination parameters. Discrimination parameters ranged from 1.79 (BA6) to 3.93 (PA5) for rapport overall and within components from 2.53 (MC3) to 4.55 (BP2). Full indices are provided in Table of the Supplementary Materials. Discrimination estimates exceeded 1.70 for all items, indicating very high differentiation between levels of rapport (Baker and Kim, 2017). These results confirm the items' ability to distinguish between participants with higher or lower ratings on rapport, supporting the validity of the Rapport-Pro.

Concurrent validity

Rapport

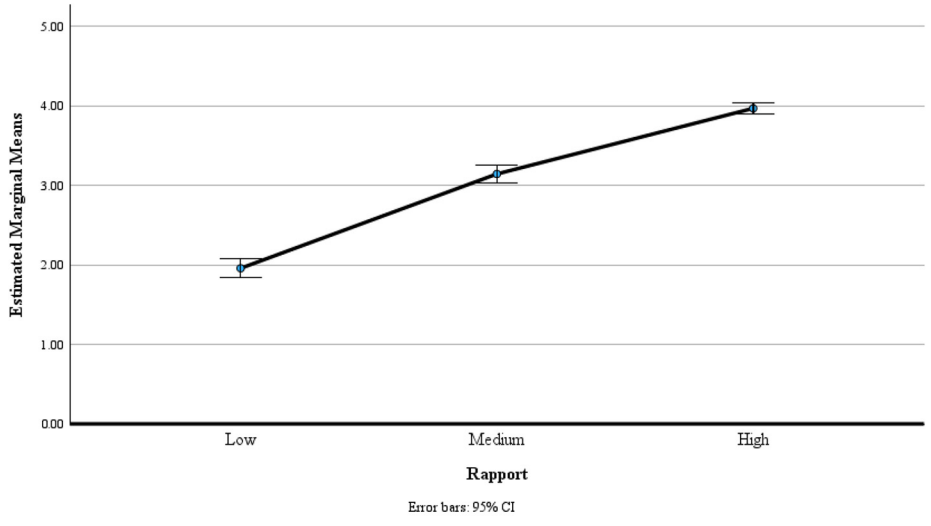
Concurrent validity assesses whether a new measure can accurately identify or predict outcomes that have already been established by a measure that is known to assess the

construct effectively (Cronbach and Meehl, 1955). In this context, the focus is on evaluating the concurrent validity of the Rapport-Pro by using a nontest criteria approach, which includes external measures or observations rather than relying solely on other standardized tests as used in previous studies (e.g. Duke *et al.*, 2018). Specifically, the analysis evaluates whether the Rapport-Pro can effectively differentiate between preestablished rapport conditions (low, moderate and high). To examine this, a one-way repeated measure analysis of variance (ANOVA) was conducted between the levels of rapport present in the videos (low vs moderate vs high) on the overall rapport ratings. The assumption of sphericity was violated, as indicated by a significant Mauchly's test. Considering the Greenhouse–Geisser estimate of sphericity was above 0.75, the Huynh–Feldt correction was used. Results revealed a significant effect of the rapport conditions, accounting for 73% of the variance, $F(1.83,311.77) = 463.14$, $p < 0.001$, $n_p^2 = 0.73$. Post hoc analyses using Bonferroni corrections (alpha = 0.016) revealed that each condition differed significantly from one another, with the ratings of rapport gradually increasing as the rapport increased in the video (see Figure 3). Lower rapport ratings were found in the low rapport condition ($M = 2.32$, $SE = 0.07$, $p < 0.001$), followed by significant increases in the moderate rapport condition ($M = 3.62$, $SE = 0.06$, $p < 0.001$) and in the high rapport condition ($M = 4.51$, $SE = 0.04$, $p < 0.001$). Therefore, the Rapport-Pro seemed to detect different nuances of rapport, indicating signs of concurrent validity.

Components of rapport

Five one-way within participant ANOVAs were conducted to assess how individual components of rapport ratings were affected by the levels of rapport present in the videos (low vs moderate vs high). As a result, a Bonferroni correction was applied on the alpha level ($p = 0.01$). The descriptive statistics are provided in Table 3. The results suggested a significant difference between the levels of rapport on each of the components of rapport, as follows: *mutual connection* $F(1.96,335.42) = 382.99$, $p < 0.001$, $n_p^2 = 0.69$, *paying attention*, $F(1.83,313.24) = 415.13$, $p = 1.03e\text{-}84$, $n_p^2 = 0.71$, *building a relationship*, $F(1.93,329.73) = 375.67$, $p < 0.001$, $n_p^2 = 0.69$, *being approachable*, $F(1.88,321.37) = 489.51$, $p < 0.001$, $n_p^2 = 0.74$ and *being professional*, $F(1.76,298.54) = 333.55$, $p < 0.001$, $n_p^2 = 0.66$. Post hoc analyses with Bonferroni corrections for each of the components

Figure 3 Estimated marginal means of the Rapport-Pro across rapport conditions



Source(s): Authors' own work

Table 3 Mean and SE of the average ratings for the five components of the Rapport-Pro according to the level of rapport present in the videos

	Low		*Moderate*		*High*	
Rapport components	*M*	*SE*	*M*	*SE*	*M*	*SE*
Mutual connection	2.23	0.069	3.34	0.074	4.43	0.044
Paying attention	2.31	0.075	3.78	0.066	4.59	0.042
Building a relationship	2.16	0.074	3.47	0.071	4.46	0.043
Being approachable	2.13	0.067	3.56	0.065	4.48	0.038
Being professional	2.78	0.065	3.92	0.055	4.57	0.040

Source(s): Authors' own work

revealed that the components were significant across all three rapport conditions, each condition (low, moderate or high) differing significantly from one another ($p < 0.001$). Overall, the average ratings of rapport increased as the rapport increased in the videos. Within each analysis, the effect sizes were moderate to large, with *being approachable* accounting for 74% of the variance in rapport, followed closely by *paying attention* (71%), *building a relationship* (69%), *mutual connection* (69%) and *being professional* (66%).

Summary of the results

The Rapport-Pro proposes a multidimensional approach to rapport, comprising a synthesis of items from published measures organized in line with recent theories and reviews of rapport. A systematic approach to item generation was applied to generate and refine an item pool evaluated via pretesting and an expert evaluation ensuring the face and content validity of the items. The Rapport-Pro emerges as a comprehensive measure with a robust theoretical framework and consists of 26 items distributed across five distinct components of rapport: (i) *mutual connection*, (ii) *paying attention*, (iii) *building a relationship*, (iv) *being approachable* and (v) *being professional*. The results of the CFA demonstrated the strong fit of the Rapport-Pro, with the second-order model being retained due to its balance of fit and parsimony. The final model showed excellent internal consistency and high discrimination parameters. Concurrent validity was established, revealing significant differences in rapport levels across different conditions, with higher rapport conditions consistently receiving higher ratings. The analysis confirmed that the Rapport-Pro is a reliable measure for detecting nuances of rapport. While these findings support the accuracy (i.e. factorial and content validity, discriminability) and appropriateness (i.e. concurrent validity) of the measure, complementary evidence is needed to further establish the psychometric properties of the Rapport-Pro according to recommended standards (AERA, APA and NCME as cited in Linn, 2011; Boateng *et al.*, 2018; DeVellis and Thorpe, 2021).

Study 2: Validation of the Rapport-Pro

Study 2 aimed to examine the stability of the theoretical framework of the Rapport-Pro by gathering evidence of its accuracy and assessing its factorial and concurrent validity using different manipulations. The appropriateness of the measure was further evaluated through construct validity, examining the relationships between the Rapport-Pro (as a whole and the five components separately) with similar constructs (convergent validity) and dissimilar constructs (discriminant validity).

Method

Design

Study 2 used both a correlational and experimental design to assess the construct validity of the Rapport-Pro and to examine whether the findings from Study 1 could be replicated. A

one-way between-participants design was adopted to manipulate the presence of rapport in three conditions (low, moderate and high).

Participants

A total of 404 participants were recruited via Prolific (www.prolific.com) and received monetary compensation for their participation. The sample size was selected *a priori* to fit the requirements of sample size suitable for a replication of factor analysis (Tabachnick and Fidell, 2014). Four participants failed both attention checks, resulting in their data being excluded. There was only one missing value, resulting in the exclusion of the participant from the data set. Overall, 399 valid cases were used in the analyses. Participants were between 18 and 79 years of age (M_{age} = 44.75, SD = 14.61); 33.8% (n = 135) were allocated to the low rapport condition, 33.3% (n = 133) were allocated to the moderate rapport condition and 32.8% (n = 131) were allocated to the high rapport condition. Participants were randomly allocated to complete one of two previously published rapport questionnaires: 49.6% (n = 198) completed Duke *et al.*'s (2018) measure, and 50.4% (n = 201) completed Vallano and Schreiber Compo's (2011) measure.

Materials

Measures: The construct validity of the Rapport-Pro was assessed by examining both convergent and discriminant validity, following Campbell and Fiske's (1959) recommendations. Participants completed the 26-item Rapport-Pro: observer along with five other measures: the RS3i (Duke *et al.*, 2018), the IIQ (Vallano and Schreiber Compo, 2015), the active listening observation scale (ALOS; Fassaert *et al.*, 2007), the celebrity endorsers' perceived trust and expertise scales (CEPTES; Ohanian, 1990) and the positive and negative affect schedule – expanded form (PANAS-X; Watson and Clark, 1994). Of these, the IIQ, the ALOS and the CEPTES were previously used by Duke *et al.* (2018) to validate their RS3i. The PANAS-X was used by Oostinga *et al.* (2018) to examine correlates of rapport. The RS3i measured constructs such as overall "rapport," as well as "attentiveness," "respect/trust," "expertise," "cultural similarity," "connected flow" and "commitment to share." The IIQ assessed overall "rapport" using evaluations of "interviewer" performance and "interaction." The "hostility," "attentiveness" and "serenity" components of the PANAS-X were also included. The CEPTES measured "trust" and "expertise" and the ALOS focused on "active listening."

Videos: One of the sets of three videos used in Study 1 was used in the current study. Here, participants were randomly allocated to watch one of these videos, featuring low, moderate or high observer ratings of rapport.

Procedure

The procedure for Study 2 followed a similar structure to Study 1, with a few key differences. Participants accessed the study via an anonymous Prolific link and were presented with information about the study, including its objectives and general procedure. After providing consent, participants were randomly assigned to watch one of three videos, each depicting varying levels of rapport between a trainee interviewer and interviewee (low, moderate and high). Videos were viewed in their entirety with a delay function preventing skipping, as in Study 1. Participants then rated rapport using the Rapport-Pro questionnaire before being randomly assigned to complete one of two published rapport measures: the RS3i (Duke *et al.*, 2018) or the IIQ (Vallano and Schreiber Compo, 2011). In addition, participants completed measures of hostility, attentiveness, serenity (PANAS-X), trust, expertise (CEPTES) and active listening (ALOS) presented in a random order. Three attention checks were included throughout the study to ensure engagement using the procedures for exclusion described in Study 1 (see Supplementary Materials). After completing all measures and providing

demographic details, participants were thanked and debriefed. The study lasted approximately 30 min.

Transparency and openness

The resources used for this study, including the data sets, materials, history of the measure development and full versions of the Rapport-Pro, are all freely available on OSF (https://osf.io/tkqx6/?view_only=276c09ea860643559ab4068c3b5f1457). This study was not preregistered. Ethical approval was granted by the Goldsmiths' Ethics Committee.

Results

Confirmatory factor analysis

The second-order model of the Rapport-Pro was subjected to a CFA. Following the same approach as in Study 1. The results of the CFA were found to replicate previous findings, thus confirming that the model is an appropriate fit to the observed data, $\chi 2\ (291) = 682.19$, $p < 0.001$, RMSEA = 0.058, 95% CI [0.052, 0.064], SRMR = 0.030, CFI = 0.96, TLI = 0.96. The parameter estimates were then examined and revealed all to be significant, further signifying a good-fitting model. The standardized factor loadings ranged from 0.71–0.88 and are presented in Table of the Supplementary Materials.

Construct validity

Following Campbell and Fiske's criteria (1959), construct validity is evidenced by moderate-to-high correlations with similar constructs (convergent validity) and low correlations with dissimilar ones (discriminant validity). This study assessed construct validity by examining correlations between the Rapport-Pro and related measures at both the first-order and second-order factor levels, aiming to determine whether the Rapport-Pro accurately captures the theoretical construct it is designed to measure.

Convergent validity

As shown in Table 4, the Rapport-Pro demonstrated strong convergent validity. The overall scale correlated highly with other rapport measures (RS3i: $r = 0.89$; IIQ: $r = 0.88$). Component-level analysis revealed specific correlations to consider. *Paying attention* correlated strongly with attentiveness measures (e.g. PANAS-X: $r = 0.71$; ALOS: $r = 0.84$). *Mutual connection* aligned closely with the connected flow (RS3i: $r = 0.83$). *Being professional* showed robust correlations with expertise-related measures (RS3i: $r = 0.85$; CEPTES: $r = 0.78$). *Being approachable* and *building a relationship* correlated broadly across rapport-related measures ($r = 0.60$–0.84). These findings affirm that components of rapport align well with theoretically related constructs.

Discriminant validity

Low correlations between the Rapport-Pro and dissimilar constructs confirmed discriminant validity. For instance, hostility (PANAS-X) correlated weakly with the overall scale ($r = -0.11$ to -0.18). Similarly, cultural similarity (RS3i) correlations were minimal ($r = 0.18$–0.27), reflecting its exclusion from the Rapport-Pro framework. The moderate association between the scale and commitment to share ($r = 0.46$–0.52) supports prior suggestions that the latter reflects rapport's behavioral outcomes rather than its essence (Duke *et al.*, 2018).

Second-order and first-order factors

Considering the theoretical second-order model of rapport, the second-order factor (rapport as a whole) consistently showed stronger correlations with related measures compared to

Table 4 Correlations between the Rapport-Pro as a whole, its five components and the construct validity scales

Construct validity scales	Rapport-Pro					
	Rapport as a whole	*Mutual connection*	*Paying attention*	*Building a relationship*	*Being approachable*	*Being professional*
Duke *et al.* (2018) RS3i	0.89**	0.86**	0.87**	0.84**	0.84**	0.85**
Attentiveness	0.86**	0.80**	0.87**	0.81**	0.82**	0.80**
Respect/trust	0.77**	0.73**	0.74**	0.73**	0.70**	0.78**
Expertise	0.87**	0.84**	0.83**	0.81**	0.81**	0.85**
Cultural similarity	0.24**	0.27**	0.23**	0.23**	0.23**	0.18*
Connected flow	0.85**	0.83**	0.82**	0.80**	0.80**	0.80**
Commitment to share	0.52**	0.51**	0.47**	0.46**	0.49**	0.52**
Vallano and Schreiber Compo (2015) IIQ	0.88**	0.83**	0.84**	0.83**	0.84**	0.83**
Interaction subscale	0.87**	0.83**	0.83**	0.81**	0.82**	0.81**
Interviewer subscale	0.86**	0.80**	0.83**	0.81**	0.81**	0.82**
Watson and Clark (1994) PANAS-X						
Hostility	−0.14**	−0.11*	−0.14**	−0.11**	−0.14**	−0.18**
Attentiveness	0.73**	0.69**	0.71**	0.65**	0.68**	0.71**
Serenity	0.69**	0.67**	0.66**	0.60**	0.64**	0.69**
Ohanian (1990) CEPTES						
Perceived trust	0.71**	0.65**	0.69**	0.65**	0.67**	0.72**
Perceived expertise	0.82**	0.78**	0.79**	0.76**	0.77**	0.78**
Fassaert *et al.* (2007) ALOS	0.85**	0.79**	0.84**	0.80**	0.80**	0.81**

Note(s): Rapport-Pro = The Rapport-Pro. *$p < 0.05$, **$p < 0.001$
Source(s): Authors' own work

individual components, supporting the hierarchical model. For example, rapport correlated highly with RS3i and IIQ scales, while measures like respect/trust correlated more with *being professional* ($r = 0.78$) than with the overall factor. Discriminant patterns were also observed: hostility's correlation with rapport ($r = 0.14$) remained lower than correlations with individual components ($r = 0.11$–0.18).

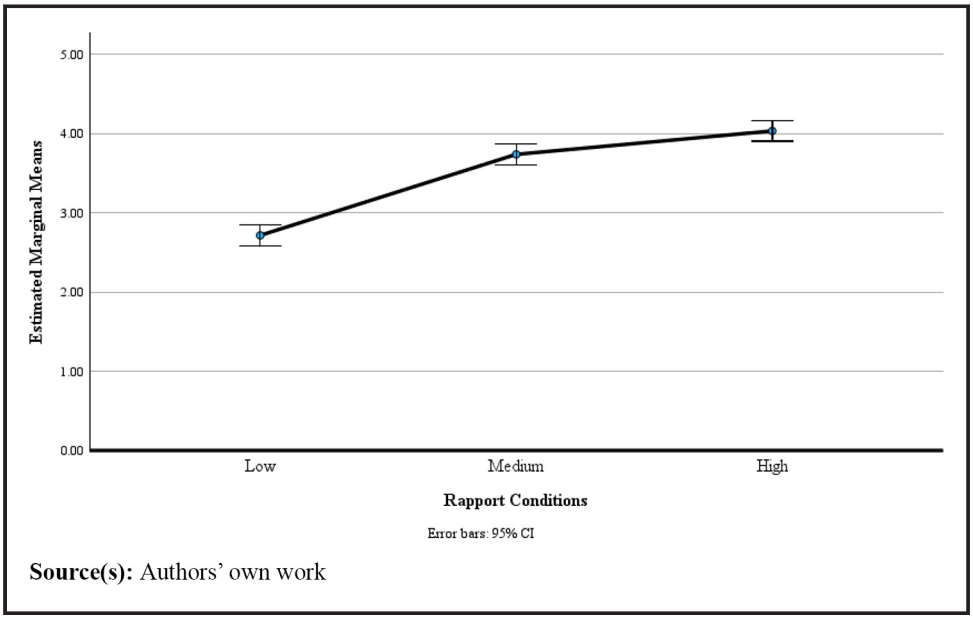
Concurrent validity

Rapport

To examine concurrent validity, a one-way between-participant ANOVA was conducted between different rapport conditions (low vs moderate vs high) on the overall rapport ratings. Results revealed a significant effect of the rapport conditions, $F(2,396) = 110.47$, $p < 0.001$, $n_p^2 = 0.36$. Considering pairwise comparisons with a Bonferroni correction (alpha = 0.016), there were significant differences between the low and high rapport conditions, *M difference* = 1.32, SE = 0.09, $p < 0.001$, between the low and moderate rapport conditions, *M difference* = 1.02, SE = 0.09, $p < 0.001$ and between the moderate and high rapport conditions, *M difference* = 0.30, SE = 0.09, $p < .001$. As in Study 1, the Rapport-Pro seemed to detect the variation in rapport, as presented in Figure 4 (see Table 5 for descriptive statistics).

As a manipulation check, a one-way between-participant ANOVA was conducted for the levels of rapport present in the videos (low vs moderate vs high) on the overall rapport ratings of the RS3i (Duke *et al.*, 2018) and the IIQ (Vallano and Schreiber Compo, 2011). Similar results to the Rapport-Pro were found, with a significant effect for rapport conditions on overall RS3i ratings, $F(2,195) = 41.60$, $p < 0.001$, $n_p^2 = 0.30$ and overall IIQ ratings, $F(2,198) = 31.07$, $p < 0.001$, $n_p^2 = 0.24$. Considering pairwise comparison for the RS3i ratings with Bonferroni correction again (alpha = 0.016), a comparable pattern was found. There was a significant difference between the low and moderate rapport conditions, *M difference* = 0.77, SE = 0.11, $p < 0.001$ and between the low and high rapport conditions, *M difference* = 0.90, SE = 0.11, $p < .001$. However, no significant differences were found between the moderate and high conditions, *M difference* = 0.12, SE = 0.11,

Figure 4 Estimated marginal means (and errors bars) according to the rapport conditions (low, moderate and high)



Source(s): Authors' own work

Table 5 Estimated marginal means of the Rapport-Pro as a whole, its five components, RS3i and IIQ

	Conditions					
	Low		*Moderate*		*High*	
	M	*SE*	*M*	*SE*	*M*	*SE*
Rapport-Pro	2.72	0.07	3.74	0.07	4.03	0.07
Mutual connection	2.60	0.07	3.56	0.07	3.67	0.08
Paying attention	2.64	0.08	3.84	0.08	4.15	0.08
Building a relationship	2.36	0.08	3.45	0.08	3.93	0.08
Being approachable	2.56	0.07	3.61	0.07	4.11	0.07
Being professional	3.27	0.06	4.12	0.06	4.23	0.06
Duke *et al.* (2018) RS3i	3.28	0.09	3.58	0.09	3.61	0.09
Vallano and Schreiber Compo (2015) IIQ	3.66	0.13	4.56	0.13	5.05	0.13

Source(s): Authors' own work

$p = 0.77$. Similar to the Rapport-Pro, the IIQ detected some differences between the low and moderate conditions, *M difference* = 0.90, SE = 0.18, $p < 0.001$, the moderate to high conditions, *M difference* = 0.49, SE = 0.18, $p = 0.022$ and the low to high conditions, *M difference* = 1.39, SE = 0.18, $p < 0.001$. Of these three measures of rapport, it appears as though the Rapport-Pro is the most sensitive measure of detecting differences.

Components of rapport

To further assess whether the Rapport-Pro can detect variations in different levels of rapport, five one-way between-participant ANOVAs were conducted to assess how the five components of the Rapport-Pro were affected by the levels of rapport present in the videos (low vs moderate vs high). A Bonferroni correction was applied on the alpha level ($p =$ 0.01). The descriptive statistics are provided in Table 5. A significant difference was found for all components of rapport between the rapport conditions: *mutual connection,*

$F(2,396) = 63.68$, $p < 0.001$, $n_p^2 = 0.24$, *paying attention*, $F(2,396) = 112.57$, $p < 0.001$, $n_p^2 = 0.36$, *building a relationship*, $F(2,396) = 109.54$, $p < 0.001$, $n_p^2 = 0.36$, *being approachable*, $F(2,396) = 126.04$, $p < 0.001$, $n_p^2 = 0.40$ and *being professional*, $F(2,396) = 74.88$, $p < 0.001$, $n_p^2 = 0.27$.

To examine these findings further, post hoc analyses were performed to consider the pairwise comparisons for each component of rapport, again applying a Bonferroni correction (alpha = 0.016). The descriptive statistics (mean and standard errors) are summarized in Table 5. The mean difference, standard errors and significance for each component of rapport between the different rapport conditions (low vs moderate vs high) are presented below in Table 6.

In sum, the results indicate that the Rapport-Pro is effective in detecting significant differences across all five components of rapport (*mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional*) when comparing different levels of rapport. Although significant differences were observed for each component, the specific patterns of significance varied only for *mutual connection* and *being professional,* highlighting the complexity of rapport and the potential interactive nature of these components in building rapport. *Paying attention, building a relationship* and *being approachable* were found to significantly increase across conditions, from low to moderate and from low to high. This suggests that the Rapport-Pro not only differentiates between varying degrees of rapport as a whole but also differentiates levels at the component level. Therefore, these findings support the model of rapport proposed in Study 1, reinforcing the idea that each component is interrelated and collectively contributes to the overall rapport experience.

Summary of the results

Study 2 successfully replicated and extended the findings of Study 1, confirming the reliability and validity of the Rapport-Pro. The results of the CFA indicated a strong model fit, reinforcing the factorial validity of the measure. Construct validity was demonstrated through high convergent correlations with similar constructs ("rapport" [RS3i], "active listening" [ALOS], "serenity" [PANAS-X], "respect/trust" [RS3i], "perceived trust" [CEPTES], "expertise" [RS3i] and "attentiveness" [RS3i and PANAS-X]) and low discriminant correlations with dissimilar ones ("hostility" [PANAS-X], "commitment to share" [RS3i], "cultural similarity" [RS3i]), confirming the appropriateness of the Rapport-Pro in measuring rapport. Concurrent validity was also replicated, as the Rapport-Pro accurately detected variations in rapport across different experimental conditions, demonstrating sensitivity to detecting rapport *as a whole*, as well as across the five components of rapport.

Table 6 Summary of changes in the five components of the Rapport-Pro (mean difference and SE) across different rapport conditions (low vs moderate vs high)

	Condition comparisons					
	Low–Moderate		*Moderate–High*		*Low–High*	
	ΔM	*SE*	*ΔM*	*SE*	*ΔM*	*SE*
Rapport-Pro						
Mutual connection	**0.96****	0.10	0.11	0.11	**1.07****	0.11
Paying attention	**1.21****	0.11	**0.31****	0.11	**1.52****	0.11
Building a relationship	**1.09****	0.11	**0.48****	0.11	**1.57****	0.11
Being approachable	**1.05****	0.10	**0.50****	0.10	**1.55****	0.10
Being professional	**0.85****	0.09	0.11	0.09	**0.96****	0.09

Note(s): Bolded entries indicate the significant comparisons of conditions. $^{**}p < .001$ and $^{*}p < 0.05$
Source(s): Authors' own work

General discussion

The current paper documents the development and validation of a new theoretically informed measure of rapport: the Rapport-Pro. The questionnaire includes five subscales to measure different components of rapport that have been reported to positively influence rapport-building within professional contexts: *mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional* (see Abbe and Brandon, 2013, 2014; Gabbert *et al*., 2021; Tickle-Degnen and Rosenthal, 1990). The Rapport-Pro has been developed in accordance with recommended standards (AERA, APA and NCME as cited in Linn, 2011; Boateng *et al*., 2018; DeVellis and Thorpe, 2021), including the following steps: construct and items identification, pretesting item rewording and reduction, content validity check using an expert evaluation, survey administration, item reduction, extraction of factors and tests of dimensionality, reliability evaluation and validity testing. In Study 1, the factorial structure of the measure was examined to assess the suitability of the Rapport-Pro's structure with observed data. Additionally, concurrent validity was assessed, revealing that the Rapport-Pro successfully identifies changes in rapport levels (e.g. low, moderate and high levels of rapport). Subsequently, Study 2 provided evidence of the stability of the Rapport-Pro's model through replication of the factorial analysis and concurrent validity findings of Study 1. In addition, construct validity was assessed considering the convergent and discriminant validity with related and unrelated constructs to rapport. Overall, the accuracy and appropriateness of the measure were confirmed by additional evidence of factorial validity (accuracy), concurrent validity and construct validity (appropriateness) of the measure.

Factorial and concurrent validity

Across two studies, support was found for a five-component model of rapport, thus aligning with the views of previous researchers who have proposed that rapport comprises different components rather than a single abstract concept (e.g. Duke *et al*., 2018; Gabbert *et al*., 2021; Tickle-Degnen and Rosenthal, 1990). Findings from the factorial analyses revealed that while the initial model appeared to be a good fit, covariances among the five main components of rapport suggested other suitable models should be examined. Upon comparison of three different models, a second-order model including five components of rapport as second-order factors (*mutual connection*, *paying attention*, *building a relationship*, *being approachable* and *being professional*), with rapport as the first-order factor, emerged as the best fit for the observed data while also addressing covariances. Thus, the current studies strongly support a middle ground: rapport should not be viewed solely as unidimensional but as comprising different components that contribute to the building of rapport. Only one study has previously tested different models of rapport following a similar procedure to the approach taken in the current paper (Magee, 2020). Similarly, their unidimensional model seemed to provide a worse fit, discrediting rapport as a single-factor solution. Magee also preferred the correlated model of rapport upon revision of the model. Although they contemplated a bifactor model, we were unable to implement it in our studies due to the presence of covariances between components of rapport. Therefore, the present findings and methodology appear to be consistent with previous research, suggesting that the second-order model of rapport is a sensible solution that provides factorial validity to the Rapport-Pro.

Examination of the internal consistency of the Rapport-Pro revealed high reliability of both the overall measure and each of its components. IRT was also used to assess the psychometric properties of the measure and address critical aspects of scale development and validation, including item analysis, score reliability, quality and validity concerns [American Educational Research Association, American Psychological Association and National Council on Measurement Education (AERA, APA, NCME), 2014]. The reliability of the Rapport-Pro was further validated through IRT analysis, which confirmed that each of

the 26 items effectively contributed to both the overall construct of rapport and its specific components. Additionally, IRT demonstrated the measure's capability to differentiate between varying levels of rapport, thereby affirming its validity at the item level. However, it is important to note that any statistical model represents an estimation of underlying constructs and rarely achieves a perfect fit (MacCallum *et al.*, 2012). Consequently, the use of a combination of CFA and IRT is often recommended to thoroughly explore psychometric properties and ensure the development of a high-quality measure (Irwing and Hughes, 2018). Despite these benefits, IRT remains a relatively novel approach and is not commonly used when developing measures. Among the prominent scales of rapport used in investigative contexts, none have incorporated IRT, typically relying on measures such as interrater reliability (e.g. Alison *et al.*, 2013; Collins and Carthy, 2018) or internal consistency assessment (e.g. Duke *et al.*, 2018) instead.

The results of this paper further confirm and replicate the concurrent validity of the Rapport-Pro, as it successfully captured variations in rapport across manipulated video conditions. Significant differences were observed in the Rapport-Pro as a whole and across individual components, though *mutual connection* and *being professional* were only significant between the low to moderate or low to high conditions. These findings suggest that certain components of rapport, such as *mutual connection*, may not significantly differ between moderate to high rapport conditions, supporting the interactive nature proposed by the Rapport-Pro model. This also aligns with the theoretical perspective that *mutual connection* is a goal rather than a prerequisite (Gabbert *et al.*, 2021). However, previous research has rarely explored how rapport is established or how its components interact, with only a few studies examining how different behavioral strategies of rapport influence information disclosure (e.g. Collins and Carthy, 2018; Huang and Teoh, 2019). Thus, the underlying processes and interactions among rapport components remain unexplored. This paper not only reinforces the Rapport-Pro as a reliable tool for detecting nuanced variations in rapport but also offers a novel perspective on the dynamics of rapport by suggesting that *mutual connection*, while a desirable goal, is not essential for establishing rapport.

Construct validity

Boateng *et al.* (2018) and Hughes (2018) both suggest that it is best practice in scale development to test at least two types of construct validity or provide similar evidence when assessing the accuracy and appropriateness of the measure. However, in professional contexts, only a limited number of studies have explored different types of validity testing, with Duke *et al.* (2018) providing the only measure to assess factorial validity (accuracy) and demonstrate construct and concurrent validity (appropriateness). Thus, the validity of the Rapport-Pro was assessed by considering different types of evidence for both the measure's accuracy (factorial, face and content validity) and its appropriateness (concurrent validity and construct validity). Construct validity (convergent and discriminant) of the Rapport-Pro was assessed and revealed strong associations between the Rapport-Pro, previous measures of rapport (Duke *et al.*, 2018; Vallano and Schreiber Compo, 2011) and rapport-related constructs ("rapport," "attentiveness," "respect/trust," "expertise," "connected flow," "serenity," "trust" and "active listening"). Moreover, interrelations among the five components of the Rapport-Pro with related constructs were observed, indicating construct validity even at the component level. For instance, *paying attention* exhibited the strongest correlations with associated constructs such as "attentiveness" and "active listening" from other measures. Additionally, the Rapport-Pro exhibited signs of discriminant validity, indicated by weak correlations between rapport *as a whole*, the five components of rapport and unrelated constructs such as "hostility," as supported by previous research (Oostinga *et al.*, 2018).

Despite Duke *et al.*'s (2018) inclusion of "cultural similarity" as a component of rapport, the Rapport-Pro and its components were not strongly related to this component. While cultural

similarity aligns with the idea that similarity improves likability (Byrne, 1962), its relevance to professional contexts remains uncertain. For example, in a study examining professionalism in medical settings, it was found that patients regarded the similarity of beliefs, values and communication style with their physician as important when rating professional and emotional support, regardless of similarity with the physician's ethnic background (Alizadeh and Chavan, 2020). As such, while the similarity hypothesis might be relevant to building rapport, factors other than cultural similarity may be more impactful and contextually relevant when developing rapport in investigative interviews. It is important to note, however, that most papers reviewed by Brouillard *et al.* (2024) are "Western-centric," featuring theories and data from Western contexts and thus limiting relevance and applicability to other cultures. Thus, more research is needed to understand the role of cultural differences in rapport building in professional contexts (Hope *et al.*, 2022).

Combining the results from convergent and discriminant validity analyses, the Rapport-Pro demonstrated strong construct validity overall, indicating its effectiveness in measuring the theoretical construct of rapport as intended and capturing the underlying concept of rapport in professional contexts. Throughout the development and validation process, the Rapport-Pro has indicated good discriminability (IRT; accuracy) as well as content (accuracy), factorial (accuracy), concurrent (appropriateness) and construct validity (appropriateness), thereby addressing current limitations in how rapport is assessed and promoting the Rapport-Pro as a reliable and validated tool.

Implications

Theoretically, the Rapport-Pro's structure inherently resonates with Tickle-Degnen and Rosenthal's (1990) model, encompassing similarities such as *paying attention* ("mutual attention"), *mutual connection* ("coordination"), *being approachable* and *being professional* ("positivity"). In contrast to this model, the Rapport-Pro allows rapport to be theorized and applied in professional contexts tailored for investigative interviews, which inherently differ from naturally occurring rapport in social settings. In social settings, rapport naturally emerges over time through shared autonomy and common experiences, whereas in investigative contexts, a power asymmetry often makes rapport instrumental and time constrained (Oxburgh *et al.*, 2023). While Abbe and Brandon (2013) adapted the tripartite model for investigative contexts, the model categorizes rapport strategies without considering their interactions or dynamics and lacks effective testing to determine if it fits observed data. This is a consistent issue in the literature with models combining various strategies or constructs, such as rapport and trust, without examining how these elements interact with each other (Brimbal *et al.*, 2021). Many models focus primarily on the outcomes of an interview, such as fostering cooperation or maximizing information disclosure and tend to list strategies to build rapport to generate these outcomes. However, the interaction and contribution of individual strategies or components of rapport are often overlooked. In contrast, the Rapport-Pro builds on existing models to map the unique contributions of each component, providing more insight into the interactions between these components. Grounded in existing theories of rapport (Tickle-Degnen and Rosenthal, 1990), it integrates novel insights regarding rapport strategy objectives (Gabbert *et al.*, 2021) while differentiating itself from concepts like trust (Hillner *et al.*, 2023). This approach offers to expand existing models of rapport, allowing for a better understanding of how rapport contributes to improved cooperation and information disclosure. Thus, the Rapport-Pro's strength lies in its robust foundation, but its success depends on further research to address limitations and refine the measure through direct application. In practice, rapport is consistently viewed as an essential component in eliciting cooperation and high-quality information and is recommended by most official interviewing guidelines (Achieving Best Evidence, Home Office, 2022; Army Field Manual, Department of the Army, 2006; College of Policing, 2022; Cognitive Interview, Fisher and Geiselman, 1992; NICHD Protocol, Lamb *et al.*, 2007; PEACE model, CPTU, 1992). However, building and

maintaining rapport is a skill that is particularly difficult to implement in practice and requires training (Griffiths and Milne, 2006). By breaking rapport into distinct subcomponents, the Rapport-Pro provides a toolkit of rapport strategies tailored to each one. It also enables the assessment of an individual's performance in these areas, helping to measure and identify specific components that may need further training. The potential empirical advance associated with the Rapport-Pro means that its application in research can directly inform official guidelines on how rapport is established and operationalized, thus complementing and supporting the official guidelines already provided. Finally, to support real-world application, the Rapport-Pro was adapted and summarized into an aide-memoir, helping practitioners self-assess and adjust their rapport-building techniques in real time (available on https://osf.io/tkqx6/?view_only=276c09ea860643559ab4068c3b5f1457). This tool is a quick, cost-effective reminder for professionals, easily accessible before or during an interview and designed to complement existing training.

Limitations

The findings of both studies must be considered in light of their limitations. First, the materials used for the rapport manipulation used in both studies (investigative interviews from a previous study that had been rated as either low, moderate or high rapport between the interviewer and interviewee) featured an online interaction recorded on Teams. Hoogesteyn *et al.* (2023) found that ratings of rapport can vary across contexts, with higher rapport ratings in face-to-face than in remote interviews. This might be because nonverbal gestures have been found to be limited even in good-quality video calls because of restricted views of headshots (Weller, 2017). Thus, it is possible that the stimuli limited the detection of dynamic interpersonal cues. That said, other studies have been successful in demonstrating that rapport can be built online (Dando *et al.*, 2023; Nash *et al.*, 2014; Nash *et al.*, 2020; Sun, 2014).

In addition, the participants in the videos were students who were aware they were engaged in a role-play exercise for investigative interview training rather than participating in real-world investigative interviews. This awareness affects the ecological validity of the study, as the emotional dynamics in real interviews are far more complex. For example, in real-life settings, interviewers must manage their own emotions while responding to the emotional reactions of interviewees. Therefore, it is reasonable to suggest that the findings and benefits of the Rapport-Pro should be replicated using different rapport manipulations and in-person interviews.

A fourth potential limitation is that the Rapport-Pro encompasses three versions: the Rapport-Pro: interviewer, interviewee and observer. The measure used in the current studies focused on an observer rating the presence of rapport in an interaction, while the interviewer and interviewee versions have yet to be evaluated. Experts in the scale evaluation commented that there is a notable difference between experiencing and witnessing rapport, arguing that the observer might miss significant nonverbal social cues. Very little research has considered different assessors' perspectives, although Weiher's (2020) research suggests that there is no correlation between ratings of rapport from an interviewee and an interviewer. Similarly, Richardson and Nash (2022) found that interviewers' ratings did not correlate with those of other assessors, suggesting that interviewers' ability to estimate their success in building rapport is compromised due to the competing cognitive demands experienced while managing an interview. Thus, the complexity of a task is likely to prevent an individual from accurately self-reflecting on their own expertise (Dunning *et al.*, 2003). Based on a meta-analysis, evidence suggests this may be due to a lack of insight into their own errors rather than inaccurate assessments of their peers, which, in turn, lead to overestimating their own performance (Ehrlinger *et al.*, 2008). Recent research suggests that focusing on an observer's perspective may provide the most reliable and valid rapport ratings, which correlate with self-reported measures of rapport (Magee, 2018). More research is clearly

needed to understand how an individual's role in an interview can influence their rapport ratings and which perspective is most closely related to interviewees' feelings of rapport.

It is also important to note that the validation process is gradual and ongoing, requiring the application and examination of the Rapport-Pro across diverse contexts to achieve comprehensive validation. The current studies only focus on cooperative witness interviews as part of the measure development process. Future research using the Rapport-Pro would be valuable in examining how different interview objectives (information-gathering vs confession-based), roles (witnesses, victims or suspects) and levels of cooperation (cooperative vs uncooperative witnesses) influence the current findings and the interaction of rapport-building components. In sum, validity testing is considered to be a gradual process rather than a tick-box exercise in which the Rapport-Pro must be applied and examined across different contexts to be fully validated.

Conclusion

In conclusion, this paper focused on the development and evaluation of the Rapport-Pro: observer, a multicomponent tool designed to measure and analyze the effectiveness of interpersonal strategies used by interviewers to establish rapport with interviewees. The Rapport-Pro was derived from a synthesis of available measures of rapport applied to a theoretical framework encompassing current theories and reviews of the use of rapport in professional contexts. Findings supported the factorial validity of the Rapport-Pro. Tests of concurrent validity confirmed the Rapport-Pro's capability to detect rapport across different conditions. Internal consistency analysis and IRT further endorsed the reliability and validity of the Rapport-Pro, demonstrating its ability to effectively distinguish between varying levels of rapport. The Rapport-Pro offers a promising tool for assessing rapport in professional interactions, providing valuable insights into its dynamics and contributing to the advancement of rapport research. Continued validation efforts and exploration of individual differences in rapport measures are warranted to enhance the utility and applicability of the Rapport-Pro in practice.

Note

1. Please see Supplementary Materials for full details of the scale development.

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Supplementary material

The supplementary material for this article can be found online.

Corresponding author

Celine Brouillard can be contacted at: c.a.brouillard@greenwich.ac.uk