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Measurement invariance of the group climate inventory across adults with and without mild intellectual disability in secure residential facilities

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Abstract

Background: The Group Climate Inventory (GCI) was tested for measurement invariance across 332 adults with and 225 adults without mild intellectual disabilities in Dutch forensic treatment, and for latent mean differences on its *Support*, *Growth*, *Repression*, and *Atmosphere* subscales.

Method: Multigroup confirmatory factor analysis was used to evaluate the configural, threshold, and loading and threshold invariance of the GCI across both groups, and to compare group latent means on each subscale.

Results: Measurement invariance was found across groups. Latent mean group comparisons showed small but significant differences reflected in lower scores on Support and Atmosphere in the group with mild intellectual disabilities.

Conclusion: The GCI allows meaningful comparisons between clients with and without mild intellectual disabilities in secure facilities. Results from the between-group comparisons suggest that consideration should be given as to whether, and why, the support and atmosphere perceptions of clients with mild intellectual disabilities might be less good.

KEYWORDS

borderline intellectual functioning, factor analysis, forensic treatment, group climate, latent mean difference, measurement invariance, mild intellectual disability, secure facility

1 | INTRODUCTION

The number of clients with mild intellectual disability or borderline intellectual functioning (IQ 50–85: hereinafter referred to as mild intellectual disabilities) in secure residential facilities is considerable. A study by Kaal (2016) estimated that the prevalence of mild intellectual disabilities amongst adults in the Netherlands is about 10% in prisons, varies from 15% to 20% in prison wards that provide specialised treatment, and is about 20% to 25% in forensic psychiatric services. Prison studies from around the world have shown that the prevalence of intellectual disabilities amongst inmates may range from 0.5% to 10%, depending on the research methods used (Fazel et al., 2008; Hellenbach et al., 2017). Residents with intellectual disabilities in secure residential facilities have limited social information processing and executive functions, complex mental and behavioural problems, including trauma resulting from adverse childhood experiences and

long treatment histories (De Vos & De Klerk, 2022; Skelding & Longfellow, 2022). This raises the question as to whether separate measures should be deployed for clients with and without intellectual disabilities in secure residential facilities.

In recent years, there has been increasing attention for group climate, and empirical research into group climate is increasingly being carried out. The importance of the group climate in mental health and correctional settings has been recognised throughout history (Dorr et al., 1980; Lanza et al., 1994; Middleboe et al., 2001; Moos, 1968). Some researchers argue that treatment in secure residential facilities cannot be effective without an open group climate characterised by structure, support, mutual trust and respect, growth opportunities, and a low level of repression to prevent re-traumatisation (Schubert et al., 2012; Tonkin, 2016). Conversely, a closed group climate is considered to be detrimental to client treatment because of a lack of structure, mutual hostility, insensitivity of staff members to the needs of clients, and a high level of repression. Group climate refers to "the quality of the social- and physical environment in terms of the provision of sufficient and necessary conditions for physical and mental health, well-being, contact and personal growth of the residents" (Stams & Van der Helm, 2017, p. 4). It is unclear whether there is a difference in perception of the group climate between clients with and without mild intellectual disabilities.

Several studies have shown associations between an open group climate and favourable clinical outcomes in clients without intellectual disabilities, such as greater personal development (Van der Helm, Stams, Van Genabeek, & Van der Laan, 2012), increased empathy (Heynen et al., 2017; Van der Helm, Stams, Van der Stel, et al., 2012), fewer mental problems (Beijersbergen et al., 2014), greater internal locus of control (Van der Helm et al., 2009), adaptive coping skills, higher level of treatment motivation (Van der Helm et al., 2014), less aversive responses to social problem situations such as hostile and aggressive behaviour (Eltink et al., 2015), and less aggressive behaviour (Robinson et al., 2018; Van den Tillaart et al., 2018). An association between an open group climate and less aggressive behaviour has also been found in clients with mild intellectual disabilities (Neimeijer et al., 2021).

Other studies have shown associations between an open group climate and favourable organisational outcomes in secure settings for people without intellectual disabilities, such as reduced employee stress (Lambert et al., 2011) and higher levels of resident satisfaction (Bressington et al., 2011). A study by Neimeijer et al. (2022) found an association between less repression perceived by clients and a well-functioning team perceived by staff in a secure treatment facility for adults with mild intellectual disabilities. In addition, they showed that fewer perceived growth opportunities by clients were associated with perceived high workload and poor team functioning by staff. Consequently, measuring and monitoring client perceptions of the group climate has become an important activity in secure residential facilities (Tonkin, 2016; Van der Helm, 2019). Group climate measures are widely deployed in secure residential facilities to assess the perceived climate quality of residents, including the EssenCES (Schalast et al., 2008) and the Group Climate Inventory (GCI; Van der Helm et al., 2011).

A study by Willets et al. (2014), using the EssenCES, found that clients in intellectual disability services did not differ in their perceptions of group climate compared to clients in non-intellectual disability services. It also seems plausible to assume that clients with mild intellectual disabilities evaluate group climate using the GCI similarly to clients without intellectual disabilities in secure residential facilities. The construct validity and internal consistency of the GCI subscales have been established in several non-intellectual disability samples in different age groups (e.g., Heynen et al., 2014; Strijbosch et al., 2014, 2018; Van der Helm et al., 2011). A study by Neimeijer et al. (2019) replicated the four-factor structure and reliability of an adapted GCI in a sample of adults with mild intellectual disabilities. However, like other studies using the GCI, they did not directly compare perceived group climate between clients with and without mild intellectual disabilities.

Therefore, it remains unclear as to whether the GCI is interpreted in the same way by clients with and without mild intellectual disabilities. A measure is considered to show 'measurement invariance' if the latent variables of interest are measured equivalently across groups (Rutkowski & Svetina, 2017). Although it is a prerequisite for meaningful comparison between groups (Schmitt & Kuljanin, 2008), no studies have investigated the measurement invariance of a group climate measure across groups with and without intellectual disabilities. The present study aims to test the measurement invariance of the GCI across an adult sample with and without mild intellectual disabilities. If the GCI shows measurement invariance across both target groups, this would mean that no separate group climate measure needs to be deployed for clients with mild intellectual disabilities in secure residential facilities. In addition, any statistical difference resulting from between-group comparisons of GCI scores can be attributed to the target groups and not to the measure.

2 | METHODS

2.1 | Participants and setting

The current study was conducted in four Dutch secure treatment facilities. In the Netherlands, the court can sentence individuals who have committed criminal offences because of mental health problems to compulsory admission to a secure treatment facility, to ensure their safe return to society without recidivism. At these facilities, mental health problems of clients that have led to their offences are treated (Barnao et al., 2016; Bonta & Andrews, 2017). Nearly all clients receiving treatment have experiences of trauma and comorbid mental, developmental, personality, behavioural, mood and substance use disorders.

Secure treatment facilities in the Netherlands can provide clients with forensic treatment at four security levels, and within treatment facilities a formal distinction is made between wards providing compulsory in-patient forensic treatment and long-term forensic treatment. Clients with a *TBS* order [a punitive measure imposed by Dutch courts on mentally disordered offenders deemed not responsible or to have diminished responsibility for their offences] are treated in the most highly secured settings, as they are considered to be at the greatest risk of recidivism. Clients with other legal measures who are viewed as significantly less likely to reoffend are treated in the low and moderately secure or open settings. In the long-term wards, forensic treatment is provided to clients who are not expected to be

able to reintegrate into society, with the aim of optimising their quality of life.

One of the four participating facilities provided mental health care specifically to people with mild intellectual disabilities. The participants with mild intellectual disabilities were from 61 wards from this facility.

The participants without intellectual disabilities were from a total of 31 non-intellectual disability wards from the other three facilities that mainly treat people without intellectual disabilities. In these facilities, clients are assessed using intelligence tests (e.g., WAIS-IV), questionnaires that map adaptive functioning (e.g., ADAPT), and observations by clinicians, and if they are found not to have intellectual disabilities, they are referred to a non-intellectual disability ward.

All participating wards were in-patient or long-term rehabilitation wards, with either high, moderate, or low security levels, as well as varying in high, moderate, or low intensities of care provided to clients.

At the time of data collection, participants with mild intellectual disabilities were treated in the northern and eastern parts of the Netherlands, and participants without intellectual disabilities in the central, southern, and western parts. The participant characteristics for the two groups and for the total sample are presented in Table 1.

2.2 | Procedure

Group climate data are routinely collected within all facilities using the GCI (see Section 2.3) to provide performance-related feedback to treatment units. During the administration of the measure, the items and response categories were read to clients with mild intellectual disabilities by trained research assistants, who also recorded the oral ratings clients gave to the items. The research assistants were neither involved in the treatment of the clients nor working in any of the rehabilitation wards, to minimise potential bias in the administration of the measure (Kooijmans et al., 2022). The clients without intellectual disabilities completed the measure on their own in a quiet room. Participation by clients was voluntary.

Data from clients with mild intellectual disabilities collected between March 2016 and June 2019, and data from clients without intellectual disabilities collected in the spring of 2019, were drawn from a secure network from the facilities.

All clients and their legal representatives provided oral and written informed consent, which included permission to use routinely collected group climate data for any research purpose, in addition to providing performance-related feedback to treatment units. Before obtaining informed consent, the clients' therapists engaged in conversations with them to ensure they understood the content of the informed consent. The study was approved by the Ethics Committee of the Faculty of Social Sciences of the Radboud University (ECSW-2021-084).

2.3 | Group climate inventory

The Group Climate Inventory (GCI) aims to measure and monitor the quality of the group climate in secure residential facilities. It was derived from the Prison Group Climate Instrument (Van der

TABLE 1 Participant characteristics.

	Mild intellectual disability group (IQ 50–85) $N = 332$	Non-intellectual disability group $N = 225$	Total $N = 557$
Age, mean (SD)	40.1 (12.4)	38.1 (11.0)	39.4 (11.9)
Sex (*N*; %)			
Male	251 (76%)	198 (88%)	449 (81%)
Female	81 (24%)	27 (12%)	108 (19%)
IQ, mean (SD)			
Total IQ	68.1 (8.3)	n/a	n/a
Verbal IQ	70.0 (8.9)	n/a	n/a
Performance IQ	71.0 (10.9)	n/a	n/a
IQ status (*N*; %)			
Mild intellectual disability (IQ 50–69)	183 (55%)	n/a	n/a
Borderline intellectual functioning (IQ 70–85)	149 (45%)	n/a	n/a
Treatment duration in weeks, mean (SD)	323.0 (323.8)	88.0 (135.2)	241.8 (295.6)
Ward type (*N*; %)			
Male-only	75 (23%)	97 (43%)	172 (31%)
Female-only	-	14 (6%)	14 (2%)
Mixed group	257 (77%)	114 (51%)	371 (67%)

Abbreviations: IQ, intelligence quotient; n/a, not applicable; SD, standard deviation.

Helm et al., 2009, 2011), and assesses four dimensions of perceived group climate, i.e., Support, Growth, Repression and Atmosphere. The GCI consists of 29 self-report items belonging to one of four subscales that represent these dimensions. All items were rated by clients on a five-point Likert-type scale (ranging from 1 = "strongly disagree" to 5 = "strongly agree"). The *support* subscale comprises 11 items (e.g., "The staff members encourage me to try new things") and refers to the support offered by staff members and their responsiveness to the specific needs of clients. *Growth* is rated with six items (e.g., "I am working towards my goals here") and encompasses facilitation of learning and preparation for a meaningful life both in and outside the facility. The *atmosphere* subscale assesses with five items (e.g., "The atmosphere is good at the ward") the degree to which structure, safety and trust between clients is nurtured by both the physical and social environment within the facility. *Repression* contains seven items (e.g., "The staff members always get their way") and evaluates the amount of control exerted by staff members, the fairness of rules and boredom amongst clients, and the amount of privacy provided to them. The sum of the item scores (after reverse-coding of *repression* items) is also used as a broad indicator of the overall quality of the perceived group climate, with a higher score indicating a more open and a lower score a more closed group climate.

The GCI adapted for the mild intellectual disability target group (see Neimeijer et al., 2019) was administered to clients with mild intellectual disabilities. In this modified version of the measure, items were adapted to the language deficits of the target group, and response categories were visually supported by smiley icons.

As mentioned in the introduction, the validity and reliability of the GCI have been established in minors and adults without intellectual disabilities (Heynen et al., 2014; Strijbosch et al., 2014, 2018; Van der Helm et al., 2011), and in adults with mild intellectual disabilities (Neimeijer et al., 2019) in various institutional settings. Table 2 summarises the minimum, maximum and mean values, standard deviations and internal consistencies of the GCI subscales and total scale for the two groups and for the total sample.

2.4 | Statistical analyses

2.4.1 | Tests of multigroup models

The measurement invariance of the GCI was tested across the groups with and without mild intellectual disabilities with sufficient sample size (Meade, 2005) using multigroup confirmatory factor analysis (MGCFA). We followed the procedures for testing measurement invariance with ordinal variables by Wu and Estabrook (2016), and followed the steps and syntax outlined by Svetina et al. (2020), using lavaan (Rosseel, 2012, 2022) and semTools (Jorgensen et al., 2022) in R (R Core Team, 2022). Missing data were handled using listwise deletion. Delta parameterisation was used, which is recommended for ordered-categorical data (Muthén & Muthén, 2012; Svetina et al., 2020).

TABLE 2 Descriptive statistics of the subscales and total scale of the Group Climate Inventory.

Measure	Mild intellectual disability group					Non-intellectual disability group					Total				
	Min.	Max.	Mean	SD	Cronbach's α	Min.	Max.	Mean	SD	Cronbach's α	Min.	Max.	Mean	SD	Cronbach's α
Support	1.10	5.00	3.59	0.81	.88	1.00	5.00	3.82	0.88	.90	1.00	5.00	3.68	0.85	.89
Growth	1.00	5.00	3.58	0.90	.81	1.00	5.00	3.48	1.03	.82	1.00	5.00	3.54	0.95	.81
Repression	1.00	4.71	2.86	0.78	.70	1.00	5.00	3.01	0.84	.73	1.00	5.00	2.92	0.81	.71
Atmosphere	1.00	5.00	3.32	0.93	.78	1.00	5.00	3.67	0.91	.74	1.00	5.00	3.46	0.94	.77
Total scale	1.45	5.00	3.44	0.71	.92	1.21	4.90	3.52	0.76	.93	1.21	5.00	3.47	0.73	.92

Note: A higher score indicates a more favourable outcome on all variables, except for Repression, on which a lower score is more favourable.
Abbreviations: IQ, intelligence quotient; SD, standard deviation.

TABLE 3 Mean, skewness, and kurtosis values of the items of the Group Climate Inventory for the sample with and without mild intellectual disabilities.

Item no.	Subscale/item	Mild intellectual disability group			Non-intellectual disability group		
		Mean (SD)	Skewness (SE)	Kurtosis (SE)	Mean (SD)	Skewness (SE)	Kurtosis (SE)
	Support						
2	The staff members assist me when I ask them to.	3.95 (1.05)	−1.07 (0.14)	0.76 (0.27)	4.31 (1.05)	−1.56 (0.16)	1.75 (0.33)
5	I trust the staff members.	3.59 (1.16)	−0.57 (0.14)	−0.41 (0.27)	4.12 (1.13)	−1.26 (0.17)	0.85 (0.33)
6	I think the staff members are honest.	3.56 (1.14)	−0.51 (0.14)	−0.44 (0.27)	3.98 (1.18)	−1.10 (0.16)	0.46 (0.33)
7	I get attention from the staff members.	3.77 (1.06)	−0.83 (0.13)	0.27 (0.27)	4.04 (1.15)	−1.18 (0.16)	0.63 (0.33)
8	The staff members listen to me when I want to tell something.	3.68 (1.17)	−0.79 (0.13)	−0.16 (0.27)	4.09 (1.14)	−1.20 (0.16)	0.61 (0.33)
17	The staff members encourage me to try new things.	3.40 (1.29)	−0.48 (0.14)	−0.91 (0.27)	3.20 (1.43)	−0.25 (0.17)	−1.21 (0.33)
18	I feel that my complaints are taken seriously by the staff members.	3.26 (1.28)	−0.35 (0.14)	−0.93 (0.27)	3.60 (1.33)	−0.56 (0.16)	−0.77 (0.33)
22	There are always enough people around to help me.	3.73 (1.18)	−0.74 (0.13)	−0.45 (0.27)	3.80 (1.27)	−0.75 (0.16)	−0.56 (0.33)
24	The staff members have little time for me.	2.65 (1.25)	0.38 (0.13)	−0.91 (0.27)	2.62 (1.41)	0.30 (0.16)	−1.22 (0.33)
25	I think the staff members manage angry clients in a good way.	3.56 (1.23)	−0.57 (0.14)	−0.60 (0.27)	3.81 (1.25)	−0.73 (0.16)	−0.48 (0.33)
26	The staff members often talk things through with the clients.	3.58 (1.21)	−0.69 (0.14)	−0.41 (0.27)	3.67 (1.34)	−0.62 (0.16)	−0.78 (0.33)
	Growth						
11	I am working towards my goals here.	3.88 (1.21)	−1.08 (0.14)	0.23 (0.27)	3.99 (1.38)	−1.22 (0.17)	0.16 (0.33)
12	I think it is good that I am here.	3.48 (1.41)	−0.56 (0.13)	−1.03 (0.27)	3.01 (1.64)	−0.05 (0.16)	−1.62 (0.33)
13	I am learning how to behave outside the facility here.	3.59 (1.30)	−0.72 (0.14)	−0.57 (0.27)	3.39 (1.47)	−0.45 (0.17)	−1.10 (0.33)
16	I get to make my own decisions here.	3.00 (1.31)	−0.15 (0.14)	−1.14 (0.27)	2.93 (1.42)	−0.03 (0.16)	−1.26 (0.33)
19	What I am learning here helps me.	3.71 (1.21)	−0.89 (0.14)	−0.06 (0.27)	3.78 (1.37)	−0.86 (0.17)	−0.47 (0.33)
21	I am learning the right things here.	3.81 (1.09)	−1.02 (0.14)	0.61 (0.27)	3.71 (1.35)	−0.79 (0.17)	−0.50 (0.33)
	Atmosphere						
1	The atmosphere is good at the ward.	3.38 (1.22)	−0.39 (0.13)	−0.76 (0.27)	3.84 (1.16)	−0.72 (0.16)	−0.26 (0.33)
4	I feel good at the ward.	3.32 (1.31)	−0.37 (0.13)	−0.98 (0.27)	3.70 (1.35)	−0.73 (0.16)	−0.67 (0.33)
9	The turmoil at the ward is driving me crazy.	2.70 (1.37)	0.26 (0.14)	−1.20 (0.27)	2.39 (1.43)	0.53 (0.16)	−1.08 (0.33)
10	The clients trust each other at the ward.	2.97 (1.23)	0.03 (0.14)	−0.91 (0.27)	3.24 (1.25)	−0.28 (0.17)	−0.72 (0.33)
14	It is safe at the ward.	3.64 (1.24)	−0.75 (0.13)	−0.40 (0.27)	3.97 (1.28)	−1.08 (0.16)	0.05 (0.33)
	Repression						
15	The staff members always get their way.	3.14 (1.28)	−0.03 (0.14)	−1.06 (0.27)	3.61 (1.26)	−0.58 (0.17)	−0.49 (0.33)
20	I am bored here.	2.98 (1.48)	0.03 (0.13)	−1.41 (0.27)	3.43 (1.50)	−0.52 (0.17)	−1.15 (0.33)
23	I feel understood by the staff members.	3.40 (1.19)	−0.46 (0.13)	−0.59 (0.27)	3.78 (1.31)	−0.91 (0.16)	−0.29 (0.33)
27	There is nothing to do here.	2.80 (1.35)	0.27 (0.13)	−1.17 (0.27)	3.11 (1.49)	−0.22 (0.16)	−1.36 (0.33)
28	It is dirty and smelly in here.	2.11 (1.20)	1.00 (0.14)	0.06 (0.27)	1.99 (1.20)	0.89 (0.16)	−0.45 (0.33)
29	This ward makes me feel down.	2.70 (1.41)	0.30 (0.14)	−1.26 (0.27)	2.86 (1.49)	0.05 (0.16)	−1.37 (0.33)

Abbreviations: IQ, intelligence quotient; SD, standard deviation; SE, standard error.

First, two separate models were fitted for each group. Second, an unconstraint model was fitted to test the configural invariance. In this model, the factor variances and scales were fixed to 1, factor means and intercepts were fixed to 0 in each group, and all item loadings and thresholds (four per item) were freely estimated.

TABLE 4 Model-data fit of MGCFA measurement invariance testing of Group Climate Inventory for group with mild intellectual disabilities versus group without intellectual disabilities.

Model	$\chi^2(df)$	RMSEA	RMSEA 90% CI	CFI	TLI	SRMR	$\Delta\chi^2(df)$	*p*	ΔCFI	ΔRMSEA
Configural invariance	1770.147(742)	.076	.072–.081	.926	.919	.077	-	-	-	-
Threshold invariance	1897.090(800)	.076	.072–.080	.921	.921	.077	171.67(58)	<.001	−.005	.000
Loading and threshold invariance	1881.103(825)	.073	.069–.078	.924	.924	.077	29.70(25)	.236	.003	−.003

Abbreviations: CFI, comparative fit index; CI, confidence interval; *df*, degrees of freedom; MGCFA, multigroup confirmatory factor analysis; RMSEA, root mean square error of approximation; SRMR, standardised root mean residual; TLI, Tucker–Lewis index; ΔCFI, change in CFI; ΔRMSEA, change in RMSEA; $\Delta\chi^2$, change in χ^2; χ^2, chi-square test of model fit.

Third, a model was fitted with thresholds constrained to be equal across the groups to test the threshold (weak) invariance. The factor variances were fixed to 1 and factor means were fixed to 0 in both groups. Factor scales were fixed to 1 and intercept means were fixed to 0 in the reference group with mild intellectual disabilities, and freely estimated in the group without intellectual disabilities.

Fourth, a model was fitted with loadings and thresholds constrained to be equal across the groups to test the loading and threshold (strong) invariance. In the reference group with mild intellectual disabilities, the factor variances, scales, and intercept means were fixed to 1, but freely estimated in the group without intellectual disabilities. Factor means were fixed to 0 in both groups.

To examine change in model fit of multigroup models, the lavTestLRT() function in lavaan was used, which tests the change in χ^2 when models are nested. A non-significant $\Delta\chi^2$ is indicative of negligible change in model fit across models, which demonstrates measurement invariance between groups. As χ^2 is sensitive to sample size, change in comparative fit index (ΔCFI) and root mean square error of approximation (ΔRMSEA) were also used to examine change in model fit, following guidelines by Rutkowski and Svetina (2017). A ΔCFI <.01 or ΔRMSEA <.015 are indicative of invariance between groups (Chen, 2007; Cheung & Rensvold, 2002).

2.4.2 | Latent mean difference tests

After measurement invariance was established (i.e., configural, threshold, and threshold and loading invariance; see Section 3.1), latent mean difference tests were conducted to compare the group latent means of the GCI subscales; the *z* scores and *p* values of the standardised model results were examined (Muthén & Muthén, 2012). In addition, Cohen's *d* effect sizes were calculated, with 0.2 indicating small, 0.5 medium, and 0.8 large effects (Cohen, 1992).

3 | RESULTS

The overall percentage of missing data on the 29 GCI items was 1.4% in the group with mild intellectual disabilities and 2.8% in the group without intellectual disabilities. Based on Byrne (2010) and Hair et al. (2010), data across all items were normally distributed for both groups. The mean, skewness, and kurtosis values for all items are shown in Table 3.

3.1 | Tests of multigroup models

CFI and Tucker–Lewis index (TLI) values ≥.95, root mean square error of approximation (RMSEA) ≤.06, and standardised root mean residual (SRMR) ≤.08 indicate good model fit. CFI and TLI between .90 and .95, and RMSEA ≤.08 indicate acceptable model fit (Hu & Bentler, 1999; MacCallum et al., 1996). The separate models fitted for the group with mild intellectual disabilities ($\chi^2_{(371)} = 1068.36$; $p = .038$, CFI = .919; TLI = .912; RMSEA = .080; RMSEA 90% confidence interval (CI) = .075–.086, SRMR = .072) and group without intellectual disabilities ($\chi^2_{(371)} = 742.54$; $p < .001$, CFI = .932; TLI = .926; RMSEA = .074; RMSEA 90% CI = .066–.081; SRMR = .083) indicated acceptable fit.

The model-data fit of the configural, threshold (weak) and loading and threshold (strong) invariance models are shown in Table 4. The three models all showed acceptable fit. The $\Delta\chi^2$ between the configural and threshold invariance models was significant, and ΔCFI <.01 and ΔRMSEA <.01, indicating invariance between both groups. The $\Delta\chi^2$ between the threshold and loading and threshold invariance models was nonsignificant, ΔCFI <.01, and ΔRMSEA <.01, indicating invariance between the groups.

3.2 | Latent mean difference tests

Comparison of group latent means of the GCI subscales revealed significantly higher scores in the group without intellectual disabilities on *Support* ($z = 3.66$, $p < .001$, $d = .31$) and *Atmosphere* ($z = 4.40$, $p < .001$, $d = .38$), with a small effect. The group with mild intellectual disabilities experienced less support from staff and a less positive atmosphere at the ward compared with the group without intellectual disabilities. No significant differences between the groups were found on *Growth* ($z = -0.37$, $p = .711$, $d = .03$) and *Repression* ($z = 1.01$, $p = .313$, $d = .09$).

4 | DISCUSSION

This study was primarily focused on investigating the measurement invariance of the Group Climate Inventory across a sample of adults with and without mild intellectual disabilities from Dutch secure treatment facilities. The configural, threshold, and loading and threshold invariance were tested sequentially using multigroup confirmatory factor analysis. The results indicate measurement invariance of the GCI across both target groups. This finding has important implications, as it supports the view that no separate group climate measure needs to be deployed for adults with mild intellectual disabilities in secure facilities. Some small adaptations for people with mild intellectual disabilities that Neimeijer et al. (2019) made with the GCI and its mode of administration (described in Sections 2.2 and 2.3) proved sufficient to make the GCI an invariant measure across both target groups. We have shown that the mean subscale scores obtained with GCI adapted for clients with mild intellectual disabilities as administered to this target group (Neimeijer et al., 2019) can be meaningfully compared with the mean subscale scores obtained with GCI as administered to clients without intellectual disabilities.

Although not a main focus, this study explored possible differences in GCI subscale scores between the target groups. Latent mean difference tests were performed, revealing small but statistically significant differences in *Support* and *Atmosphere* between the two groups, and nonsignificant differences in *Growth* and *Repression*.

Inconsistent with the findings of Willets et al. (2014), our results from the latent mean difference tests do show some differences in group climate perceptions between both target groups. The study by Willets et al. (2014) reported no differences in mean subscale scores between 45 clients in secure mental health services for people with intellectual disabilities and 19 clients from such services for people without intellectual disabilities. The discrepancy in results between our study and that of Willets et al. (2014) may reflect differences in group climate measures as they used the EssenCES. Moreover, formal studies have yet to show whether the EssenCES shows measurement invariance across the two target groups. In addition, sample differences may have resulted in conflicting study results. It is unknown to what extent our sample with mild intellectual disabilities corresponds to their sample that has intellectual disabilities. Furthermore, the study by Willets et al. (2014) included clients from medium and low-security wards, while our study also included clients from high-security wards, which may further explain the difference in results. However, our preliminary results showing small but statistically significant differences in Growth and Atmosphere between the target groups should be carefully considered due to the limitations inherent in the current study.

Our limited sample size did not allow for multilevel analysis. In studies on group climate, multilevel analyses are warranted due to the nested structure of the data: clients are clustered within wards and wards within facilities (Van Ginneken & Nieuwbeerta, 2020). As we did not perform multilevel analyses, we did not account for possible differences between participating wards and facilities, making it inaccurate to attribute the differences found on the two GCI subscales solely to the target groups. The differences found on the two subscales may also have resulted from differences between the contexts of the wards and facilities. Moreover, disregarding the three-level structure of our data may have led to an overestimation of the between-group differences on both subscales (Castanho Silva et al., 2019; McCoach & Cintron, 2022). The interpretation of our results surrounding the differences between target groups on the two subscales is further complicated by an uneven distribution of clients with and without mild intellectual disabilities across the facilities. The clients with mild intellectual disabilities were from one mild intellectual disability focused facility, and the clients without intellectual disabilities were spread across three mostly non-intellectual disability focused facilities. The results of the current study might have been different if both clients with and without mild intellectual disabilities had been recruited from facilities with similar contexts that offer treatment to both target groups. Finally, data were collected from clients with mild intellectual disabilities over several years, and not over a one-time period as with clients without intellectual disabilities. Our findings may be biased as a result of possible changes in the composition of the wards and organisational policies during that several-year period.

This study has demonstrated measurement invariance of the GCI across clients with and without mild intellectual disabilities in secure facilities, providing a solid basis for using the measure in cross-group comparative research. We went through the initial exploration of between-group differences on the GCI subscales and found small but significant differences on two subscales to the disadvantage of the group with mild intellectual disabilities. However, the aforementioned study limitations prevent us from making sound recommendations for practice based on our findings on differences between groups in perceptions of group climate. Therefore, more evidence is needed from future studies on the possible differences between groups in GCI scores, which would require addressing these limitations. Future studies need to extend our study using multilevel analysis in a sufficiently large sample for cross-group comparison of GCI scores and should include a mixed pool of both clients with and without mild intellectual disabilities across all participating facilities. This may allow more accurate conclusions to be drawn as to whether, and why, the Support and Atmosphere scores of clients with mild intellectual disabilities might be less good compared with clients without intellectual disabilities.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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