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Action	Manuscript Number	Title	Initial Date Submitted	Status Date	Current Status	Date Final Disposition Set	Final Disposition
Action Links	ACTPSY-D-23-00741	Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia	Sep 26, 2023	Aug 20, 2024	Completed - Accept	Aug 20, 2024	Accept

An evaluation of psychometric properties of homophobia scale using data from Indonesian religion-based university students

Abstract
This study aims to analyse the psychometric properties of the Indonesian translated homophobia scale. Data from a total of 327 state and private religion-based universities were analysed using Rasch model analyses, including the analysis of scale' principle component analysis (PCA) aspect, reliability analysis and the assessment of differential item functioning (DIF). The analysis showed that the homophobia scale accounted for 42.4% for the range of raw variance, indicating the unidimensionality of the scale. The scale exhibited an acceptable level of person reliability and an excellent reliability level for the item. The findings revealed a significant effect of all demographic aspects with age and study program were reported to have more DIF items. Male students were reported to be more tolerant toward homosexuals than females. Although students from state universities tend to be more tolerant than those in private universities, they negatively viewed homosexuality when it was associated with AIDS. In short, the homophobia scale assessed in the current study has sufficient psychometric properties and reveal promising construct validity.

Keywords: homophobia; religion-based universities; Rasch analysis, psychometric assessment, psychometric properties

Introduction

The stigmatisation of homosexuals among university students has been well documented in the literature. For example, a study by Kite and Bryant-Less (2016) has shown that many homosexual students received discrimination acts from other peers with different sexual orientations. In a similar context, Winberg et al. (2019) showed that the stigmatisation of homosexuals had led North American students to start using some phrases such as "That's so gay!" and "No homo!" as the negative expressions inferring that being homosexuals are inferior to being heterosexuals. In Mexico, the percentage of rejection toward homosexuals among undergraduate students had reached 18% and 3%, including extreme rejection (Moral de la Rubia & Valle de la O, 2014). In African universities, many homosexual students were reported to experience stigmatisation by usually being labelled as sinners, satanic or 'demon possessed' (Mavhandu-Mudzusi, 2017). Mavandu-Mudzusi (2017) also described that stigmatisation and discrimination happened almost everywhere on campus, including in lecture halls at the university or other areas such as student residential areas and sports grounds.

Generally, individuals' negative stigmatisation, discrimination or rejection towards people who have homosexual orientation is well known as homophobia. George Weinberg first coined the term homophobia in 1967 to reflect an irrational condemnation of homosexuals, including violence, deprivation, and separation acts (Britton, 1990). According to Barragán-Medero & Pérez-Jorge (2020), many reject homosexuals using their personal justification, claiming that homosexuals are unacceptable conduct in their society. As a result, many people, particularly those studying in the university, experience isolation in addition to verbal harassment such as insults, slurs, threats of harm, and even physical abuse (Allen, 2019; Mathies et al., 2019). In other words, homophobia can reflect the act of disliking toward people with different sexual preferences in which it involves harmful behaviour as a form of self-justification toward undesirable sexual differences.

The growing negative stigmatisation among homosexuals has prompted the development of several measures to evaluate the individual attitudes towards homosexuality and homosexuals. In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes toward a diverse set of topics (O'Donohue & Caselles, 1993). Unfortunately, O'Donohue and Caselles (1993). argue that Smith did not provide a clear description related to the H-scale he developed in addition to the failure in providing the threshold for categorisation. In 1984, Herek developed an instrument to evaluate two aspects of rejection toward gay men and rejection toward lesbians. Harek's instrument named the 'Attitudes Towards Lesbians and Gay Men (ATLG) comprises 20 items: 10 items to assess the attitude towards gay men and ten items towards lesbians (Moral de la Rubia & Valle de la O, 2014). Interestingly, ATLG is widely used and validated in a varied context in different countries (Herek & McLemore, 2013). Although ATLG is reported to have a high level of internal consistency, ALTG does not seem to provide a good fit to data from Latin American countries.

Among other homophobia scales, two scales developed by Larsen et al. (1980) and Klamen et al. (1999) have attracted attentions from many scholars and practitioners. In their paper, Larsen et al. (1980) described three phase-development processes of a homophobia scale known as Heterosexual Attitudes Towards Homosexuality (HATH). The reliability assessment of 20 HATH scale items yielded a coefficient of 0.85, indicating the high internal consistency. In addition, Klamen et al. (1999) developed twelve question items to evaluate attitudes towards homosexuals and homosexuality. Using the data of 100 second-year medical students, the reliability assessment of the scale has revealed a high level of internal consistency with Cronbach's alpha of 0.90. Unfortunately, little has been explored on how a new scale developed from the previous studies (i.e. Klamen et al., 1999; Larsen et al., 1980) is validated, mainly using data from religion-based universities in South Asian country such as Indonesia. Larsen et al. (1980) has indicated in their study that religiosity correlated with students' attitudes toward homosexuals.

The current study was conducted to assess the psychometric properties of the homophobia scale using data from religion-based universities. To this end, the Rasch model analysis method was employed, and several Rasch statistical analyses were performed, including the analysis of scale' principle component analysis (PCA) aspect, reliability analysis and the assessment of differential item functioning (DIF). Rasch is a one-parameter item-response formulation that enables researchers or scale developers to assess the item's difficulty level and the person's ability to respond to the questionnaire items (Ben, 2020). In Rasch model analysis, the ordinal data collected from the survey were assessed as frequencies and were observed as an odd probability (Rusland et al., 2020). It is critical to highlight that the scores of particular homophobia constructs in the previous studies were obtained by summing the numerical values across the scale items (Klamen et al., 1999; Moral de la Rubia & Valle de la O, 2014). However, summing the item responses could raise concern because the assumption of having the same distance between categories for all participants is still uncertain for ordinal data (DiStefano & Jiang, 2020). As an alternative, Rasch measurement runs on a logarithm that allows the researchers to convert the odd probability into equal-interval-types for each scale unit (Boone et al., 2014, 2016). In other words, Rasch analysis reflects reliable and objective measurements where the relationship between the difficulty level of questionnaire item and the person (respondent) ability to respond to the items are assessed under the same interval (Rusland et al., 2020). Furthermore, the choice of employing Rasch model in the current study was made for its capability in evaluating the latent traits (Colledani et al., 2020) and providing invariant measurement characteristics within numerous contexts (Wright, 1992 cited in Yu, 2020).

Method

Sample

The data for the analysis in the current study were collected from two cohorts of students: state religion-based university students and private-religion-based university students in Indonesia. Using a non-probability sampling method, 327 students participated in the current study, comprising 98 students from state religion-based universities and 229 students from private-religion-based university students. Most of the students were Muslim (N=322), and some were Protestant (N=4) and Buddhist (N=1). A more detailed demography of the participants is described in the following Table 1.

Table 1 Demography of the participants

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21 – 25	112	34.3
	26 – 30	15	4.6
	31 – 35	2	0.6
	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Public university	229	70.03

Data collecting instrument and procedure

The research protocol for the data collecting procedure was approved to the authors' university ethic committee. The data collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999; Larsen et al., 1980), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age and the study program that students took at the time of the survey. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree, agree, neutral, disagree, and strongly disagree. Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (see Klamen et al., 1999). After the ethic clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. Students' participation was voluntary, and consent from the participant was collected prior to the data analysis.

Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principle Component Analysis (PCA), the analysis

of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1 application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items. Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020).

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit the Rasch analysis because their logit values were observed beyond the threshold -2 and +2 (see Huang et al., 2020). Linacre (2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (i.e. Linacre, 1994; Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

Result

Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2 Students responses to Homophobia scale items

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	-0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	-1.10	0.08
Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	-0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	-0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	-0.42	0.07

Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	-0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	-1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE=standard of error

Table 3 Descriptive statistics for person and item

	Person statistics (N=213)		Item statistics (N=17)	
	Total score	Logit	Total score	Logit
Min	25.0	-2.20	401.0	-1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	-0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at -0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Figure 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

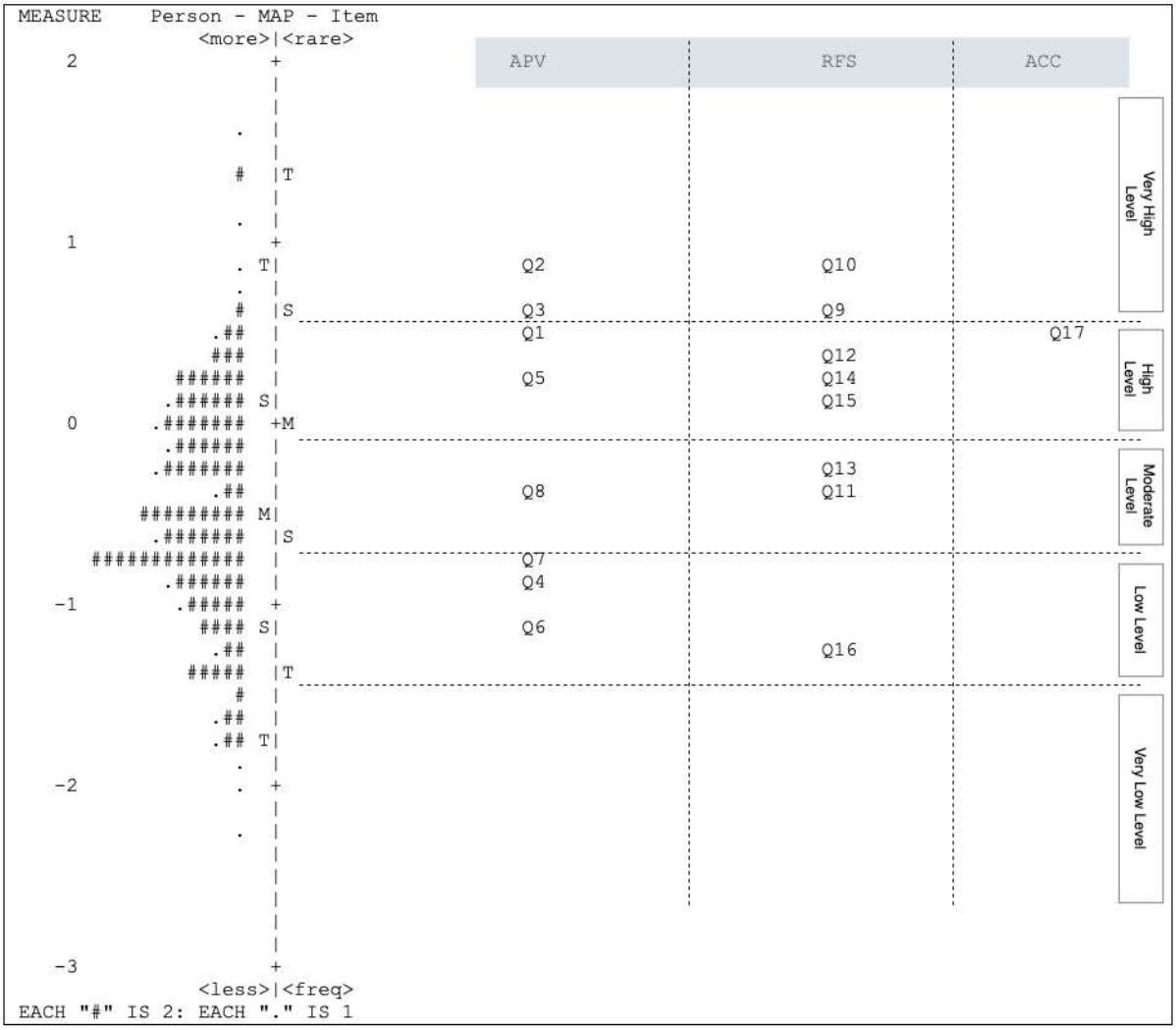

Fig 1. Wright person-item map (N= 213).

"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\,G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1-8, Refusal (RFS): Q9-16, Acceptance (ACC): Q17)

Evaluation of Rasch PCA

The analysis of Rasch Principle Component Analysis (PCA) was performed to test the assumption of unidimensionality of the homophobia scale. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20% (the global scale=42.4%, the Approval subscale=55.0% and Refusal subscale=48.2%). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level ($\alpha > 0.90$), and the

reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

Differential Item Functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Table 5 and Table 6 exemplifies the DIF on gender and university demography, respectively.

Table 4 Potential DIF on the scale item

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21 – 25 (2) 26 – 30 (3) 31 – 35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,
4	University	State university (1) Public university (2)	2	Q8, Q16

Table 5 DIF on scale item for gender

Item	Gender	DIF measure	DIF contrast	*t*	*p*
Q10	1	1.31	0.56	2.83	0.00
	2	0.74			
Q11	1	-0.01	0.57	3.50	0.00
	2	-0.59			

Table 6 DIF on scale item for gender

Item	University	DIF measure	DIF contrast	*t*	*Probability*
Q8	4	-0.23	0.60	3.72	0.00
	2	-0.83			
Q16	4	-1.05	0.66	3.78	0.00
	2	-1.71			

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about

homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast > 0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15%, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items (N=10) were considered difficult to respond (Logit value > 0.00), and few items were regarded as easy (N=4). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society.

It is critical to highlight that many scale items had potential DIF in reference to the participants' demography aspects. Particularly, potential DIF was observed on many items related to the participants' age ($N_{DIF} = 14$) and their study program ($N_{DIF} = 9$). The findings indicate the need to modify the classification of age and the study program. Related to the participants' gender and university, for example, findings of the current study revealed that female students had more negative views than the male participants. This finding does not correspond to the earlier study suggesting that male people tend to be more tolerant concerning homosexuality than their female counterparts (see Larsen et al., 1980). In addition, students from state universities tend to be supportive to homosexuals than those in private universities, but they had negative views about homosexuality when it was associated with AIDS.

The psychometric analysis in the current study also has revealed that the reliability of the homophobia scale was in the acceptable range (Cronbach's alpha = 0.79). However, such reliability remained lower than one reported in the earlier study (i.e. Klamen et al., 1999; Moral-de la Rubia et al., 2015). It is important to highlight the distinct between the homophobia scale properties assessed in the current study and the scale in the earlier studies. The homophobia scale proposed by Klamen et al. (1999) comprised 12 items with four alternative responses. In addition, in their study, Moral-de la Rubia et al. (2015) selected only 8 of 12 items on the homophobia scale and modified the alternative into seven responses. These differences may explain the discrepancy of the reliability score between the two homophobia scales and the different contexts of the study participants. Nevertheless, despite the person reliability result, the item reliability has shown satisfactory result, revealing the excellent reliability level ($\alpha > 0.90$). This excellent item reliability has suggested that the homophobia scale possesses an excellent internal consistency (see You et al., 2020).

Conclusions and recommendation for further research

Overall, the assessment of the homophobia scale using the data from religion-based university students suggests that the scale possesses sufficient psychometric properties and reveals promising construct validity. However, the psychometric assessment of the homophobia scale in the current study has limitations. In the study, we assume that students had sufficient motivation to respond to all the given statements. We also thought that students might have comprehended all statements very well and provided their honest responses. Despite the fact that about 34.9% of data were considered outliers from the initial sample of 327 participants. Since the current study involved students from religion-based universities, some other variables related to their religion, both perception and practices, might have interfered with their responses. Further validation study thus should consider the participants' background of religion, perspective and practices.

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Abstract

This study aims to evaluate the homophobia scale psychometrically in students from religion-based universities in Indonesia. This research is important to carry out because homosexuality is a controversial issue and is still a discussion of pros and cons. The Homophobia Scale is a tool that assesses attitudes towards homosexuality which consists of 17 items measuring the dimensions of positive affirmation, negative cognition and threat of homosexual behavior. This homophobia scale was prepared in the context of Indonesia with its society which tends to be religious. The homophobia scale is an adaptation of The Heterosexual Attitudes Towards Homosexuality (HATH) Scale and Items which was translated by bilingual experts who are native English speakers. The scale was then tested for content by psychologists and communication experts and then field tested to validate and test its reliability. Data from a total of 327 state and private religion-based universities, with respondent age range of 18-35 years, were analysed using Rasch model analyses, including the analysis of scale principal component analysis (PCA) aspect, reliability analysis and the assessment of differential item functioning (DIF). The analysis showed that the homophobia scale accounted for 42.4% for the range of raw variance, indicating the unidimensionality of the scale. The scale exhibited an acceptable level of person reliability and an excellent reliability level for the item. The findings revealed a significant effect of all demographic aspects with age and study program were reported to have more DIF items. Male students were reported to be more tolerant toward homosexuals than females. Although students from state universities tend to be more tolerant than those in private universities, they negatively viewed homosexuality when it was associated with AIDS. In short, the homophobia scale assessed in the current study has sufficient psychometric properties and reveal promising construct validity. The results of this research prove that among students from religious-based universities, negative stigma towards homosexuals and homophobia still exists even though interacting with homosexuals is still carried out, but within certain limits.

Keywords: homophobia; religion-based universities; Rasch analysis, psychometric assessment, psychometric properties

Introduction

The stigmatisation of homosexuals among university students has been well documented in the literature. For example, a study by Kite and Bryant-Less (2016) has shown that many homosexual students received discrimination acts from other peers with different sexual orientations. In a similar context, Winberg et al. (2019) showed that the stigmatisation of homosexuals had led North American students to start using some phrases such as "That's so gay!" and "No homo!" as the negative expressions inferring that being homosexuals are inferior to being heterosexuals. In Mexico, the percentage of rejection toward homosexuals among undergraduate students had reached 18% and 3%, including extreme rejection (Moral de la Rubia & Valle de la O, 2014). In African universities, many homosexual students were reported to experience stigmatisation by usually being labelled as sinners, satanic or 'demon possessed' (Mavhandu-Mudzusi, 2017). Mavandu-Mudzusi (2017) also described that stigmatisation and discrimination happened almost everywhere on campus, including in

lecture halls at the university or other areas such as student residential areas and sports grounds.

Generally, individuals' negative stigmatisation, discrimination or rejection towards people who have homosexual orientation is well known as homophobia. George Weinberg first coined the term homophobia in 1967 to reflect an irrational condemnation of homosexuals, including violence, deprivation, and separation acts (Britton, 1990). In his view, Weinberg views homophobia as a mental illness. Homophobia is defined as a form of negative emotions, attitudes and behavior shown towards individuals who have different sexual orientations, be they lesbian, gay, bisexual and transgender (Beydağ & Alp Dal, 2022), while Kimmel (2017) more specifically links homophobia to behavior and Sexual acts related to homosexuals (men). Another definition states that Homophobia is defined as an irrational fear or hatred of individuals who are attracted to the same gender (Pharr, 1997). In contrast to these two opinions, Welzer-Lang (1994) considers that homophobia is not necessarily related to sexual orientation. He believes that there are two phenomena in homophobia, namely how to regulate relations between men and women by collecting masculinity from all feminization and secondly regarding sexism and male domination.

According to Welzer-Lang (1994) categorizes that homophobia that appears does not always depend on sexual orientation but can display gender violations of generally accepted regulations and physical homophobia related to sexual orientation which is shown in the form of verbal and physical aggression. Different from research results Barragán-Medero & Pérez-Jorge (2020), many reject homosexuals using their personal justification, claiming that homosexuals are unacceptable conduct in their society. As a result, many people, particularly those studying in the university, experience isolation in addition to verbal harassment such as insults, slurs, threats of harm, and even physical abuse (Allen, 2019; Mathies et al., 2019). In other words, homophobia can reflect the act of disliking toward people with different sexual preferences in which it involves harmful behaviour as a form of self-justification toward undesirable sexual differences. In several research results, people who believe that sexual orientation is a "choice" tend to be less tolerant of homosexuality than those who believe that it is something that is beyond the individual's control. Likewise, people who have had contact with lesbian or gay men tend to have more positive attitudes towards homosexuals compared to those who have never had contact (Kimmel, 2017).

In his study, Fyfe (1983) shows that homophobia can occur at three different levels: 1) cultural homophobia, which aims to maintain different gender roles in conservative views; 2) homophobic attitudes, in the form of a series of continuous negative attitudes towards homosexuals; 3) homophobia as a personality correlate with rigidity, authoritarianism, conservatism and intolerance to ambiguity and deviation. The culture of maintaining gender in a conservative view is influenced by cultural norms protected by religion (Wilets, 2016). However, religion is not always the main agent that shapes homophobic behavior (G. Herek, 1984; Schulte & Battle, 2004) and sometimes does not contribute at all to homophobic attitudes (Wilets, 2016). In some cases it is true that religion often strengthens or sanctions positive attitudes towards homosexual qualities, but the relationship between religion and homophobia is that "religion" is not the same as homophobia. The negative attitudes shown towards homophobia are shown in the form of negative comments and also violence caused by hatred towards gays and lesbians (Odenbring & Johansson, 2021).

The level and intensity of homophobia in society depends on public awareness of the existence of homosexuals in a population, and this has increased sharply during the decades of the twentieth century (Morris, 2019). Various homophobia studies have been conducted to measure attitudes towards homosexuals towards gays and lesbians. A cross-sectional study of medical students from 12 universities in Peru stated that male chauvinist students were more homophobic than female students. This is influenced by, among other factors, women's

gender is more tolerant, they study in the capital, adhere to the Catholic religion and they already know about homosexuals and have interacted with them (Nieto-Gutierrez et al., 2019).

Homophobia can be measured using several methods (Fraïssé & Barrientos, 2016). In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes toward a diverse set of topics (O'Donohue & Caselles, 1993). Unfortunately, O'Donohue and Caselles (1993). Argue that Smith did not provide a clear description related to the H-scale he developed in addition to the failure in providing the threshold for categorisation. In 1984, Herek develop the concept of "sexual prejudice" which describes negative attitudes towards homosexuality. In this sexual prejudice, the attitudes and behavior that emerge are hostile to homosexuals. Herek developed an instrument to evaluate two aspects of rejection toward gay men and rejection toward lesbians. Harek's instrument named the 'Attitudes Towards Lesbians and Gay Men (ATLG). On this scale, respondents must answer the extent to which they agree with statements about homosexuality and sometimes bisexuality. This scale also measures how comfortable they are when dealing with homosexual people (gay/lesbian) in various social situations. This scale consists of 20 items : ten items to assess the attitude towards gay men and ten items towards lesbians (Moral de la Rubia & Valle de la O, 2014). Interestingly, ATLG is widely used and validated in a varied context in different countries (Herek & McLemore, 2013). Although ATLG is reported to have a high level of internal consistency, ALTG does not seem to provide a good fit to data from Latin American countries.

Among other homophobia scales, two scales developed by Larsen et al. (1980) and Klamen et al (1999) have attracted attentions from many scholars and practitioners. In their paper, Larsen et al (1980) described three phase-development processes of a homophobia scale known as Heterosexual Attitudes Towards Homosexuality (HATH). The reliability assessment of 20 HATH scale items yielded a coefficient of 0.85, indicating the high internal consistency. Results from all three phases of this research confirm that patterns of anti-homosexual attitudes are predictable and rooted in conservative and punitive views. This attitude pattern is often found in men, business students, frequent churchgoers, having fundamental views in religion and being authoritarian, so it can be said that HATH is significantly correlated with attitudes, religion and authoritarianism. In addition, Klamen et al. (1999) developed twelve question items to evaluate attitudes towards homosexuals and homosexuality. This instrument was developed from research previously conducted by Larsen et al (Larsen et al., 1980a) which was then added with questions about students' sexual activities and orientation and their previous work with AIDS patients. This homosexuality question was posed to medical students for the purpose of defining expressions of discomfort and disapproval towards homosexuality and homosexuals. Using the data of 100 second-year medical students, the reliability assessment of the scale has revealed a high level of internal consistency with Cronbach's alpha of 0.90. Previous research was mostly conducted on medical students and nursing students who may be biased between caring for individuals with different sexual orientations and the gender biases and prejudices held by these students. In Indonesia itself, there is still little research that explores the scale of homophobia. This research is important to carry out because the issue of homosexuality is still a matter of pros and cons in Indonesian society which tends to be religious. With this research, it is hoped that it can provide an overview of the psychometric properties of the homophobia scale that are appropriate to the Indonesian context. Unfortunately, little has been explored on how a new scale developed from the previous studies (i.e. Klamen et al., 1999; Larsen et al., 1980) is validated, mainly using data from religion-based universities in

South Asian country such as Indonesia. Larsen et al. (1980) has indicated in their study that religiosity correlated with students' attitudes toward homosexuals.

The current study was conducted to assess the psychometric properties of the homophobia scale using data from religion-based universities. For this reason, the Rasch model analysis method is used which can more objectively assess the psychometric properties of the homophobia scale developed by testing the validity and reliability of the instrument by testing the suitability of people and items simultaneously used (Boone et al., 2014, 2016). To this end, the Rasch model analysis method was employed, and several Rasch statistical analyses were performed, including the analysis of scale' principal component analysis (PCA) aspect, reliability analysis and the assessment of differential item functioning (DIF). Rasch is a one-parameter item-response formulation that enables researchers or scale developers to assess the item's difficulty level and the person's ability to respond to the questionnaire items (Ben, 2020). In Rasch model analysis, the ordinal data collected from the survey were assessed as frequencies and were observed as an odd probability (Rusland et al., 2020). It is critical to highlight that the scores of particular homophobia constructs in the previous studies were obtained by summing the numerical values across the scale items (Klamen et al., 1999; Moral de la Rubia & Valle de la O, 2014). However, summing the item responses could raise concern because the assumption of having the same distance between categories for all participants is still uncertain for ordinal data (DiStefano & Jiang, 2020). As an alternative, Rasch measurement runs on a logarithm that allows the researchers to convert the odd probability into equal-interval-types for each scale unit (Boone et al., 2014, 2016). In other words, Rasch analysis reflects reliable and objective measurements where the relationship between the difficulty level of questionnaire item and the person (respondent) ability to respond to the items are assessed under the same interval (Rusland et al., 2020). Furthermore, the choice of employing Rasch model in the current study was made for its capability in evaluating the latent traits (Colledani et al., 2020) and providing invariant measurement characteristics within numerous contexts (Wright, 1992 cited in Yu, 2020).

Method

Sample

The data for the analysis in the current study were collected from two cohorts of students: state religion-based university students and private-religion-based university students in Indonesia. Using a non-probability sampling method, 327 students participated in the current study, comprising 98 students from state religion-based universities and 229 students from private-religion-based university students. Most of the students were Muslim (N=322), and some were Protestant (N=4) and Buddhist (N=1). The status of students who are still actively studying at any level of education at a religion-based university starting from diploma, bachelor's, master's and doctoral degrees and who provide verbal consent (which is registered digitally before the survey) are included as participants in this research. In the participant demographic table, participants' socio demographics are explained based on gender, age, study program and university of origin to clarify the participant's condition.A more detailed demography of the participants is described in the following Table 1.

Table 1 Demography of the participants

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21 – 25	112	34.3
	26 – 30	15	4.6
	31 – 35	2	0.6

	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Private university	229	70.03

Data collecting instrument and procedure

The research protocol for the data collecting procedure was approved to the authors' university ethic committee. The data collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999; Larsen et al., 1980), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. This instrument was chosen in this study because the items in this study are appropriate to the context of society in Indonesia where many participants still have conservative and fundamentalist views in religion (Larsen et al., 1980) and include elements of associated risk. with health (Klamen et al., 1999). The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age and the study program that students took at the time of the survey to clarify the sociodemographic conditions of participants. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree (score = 5), agree (score = 4), neutral (score = 3), disagree (score = 2), and strongly disagree (score = 1). Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (see Klamen et al., 1999). After the ethic clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. Students participation was voluntary, and informed consent was based on information, participant confidentiality and potential risks arising from research collected prior to data analysis. Data collection was carried out through an online survey using Google forms so that it was effective considering that participants came from all regions of Indonesia and also made it easy to fill in so it didn't take too long. The questionnaire distributed explains the purpose of the research and the rights that participants have while participating in the research.

Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principal Component Analysis (PCA), the analysis of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1 application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items.

Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020). In Rasch everything can be predicted so that we can assess the psychometric properties of the homophobia scale more objectively.

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit the Rasch analysis because their logit values were observed beyond the threshold -2 and +2 (see Huang et al., 2020). Linacre (2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (i.e. Linacre, 1994; Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

Result

Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2 Students responses to Homophobia scale items

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	-0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	-1.10	0.08
Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	-0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	-0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	-0.42	0.07
Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	-0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	-1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE=standard of error

Table 3 Descriptive statistics for person and item

	Person statistics (N=213)		Item statistics (N=17)	
	Total score	Logit	Total score	Logit
Min	25.0	-2.20	401.0	-1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	-0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at -0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Figure 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

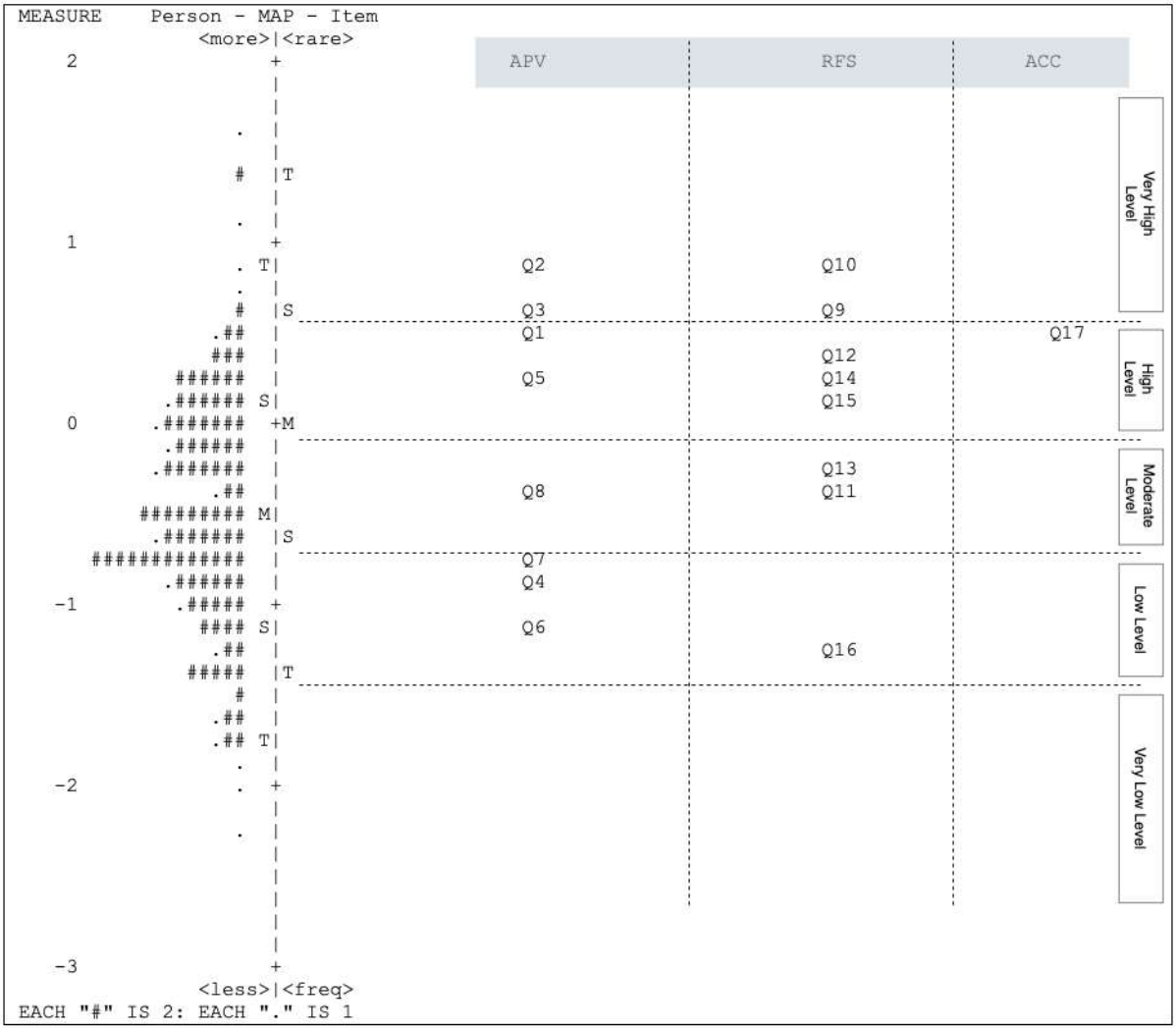

Fig 1. Wright person-item map (N= 213).

"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\,G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1-8, Refusal (RFS): Q9-16, Acceptance (ACC): Q17)

Evaluation of Rasch PCA

Rasch PCA analysis was carried out to test the assumption of unidimensionality of the homophobia scale which states that (1) the easier the question, the more likely participants are to respond to the homophobia scale correctly, and (2) the greater the ability of participants, the greater the possibility they answered questions on the homophobia scale correctly. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20% (the global scale=42.4%, the Approval subscale=55.0% and Refusal subscale=48.2%). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits

continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level ($\alpha > 0.90$), and the reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

Differential Item Functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Table 5 and Table 6 exemplifies the DIF on gender and university demography, respectively.

Table 4 Potential DIF on the scale item

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21 – 25 (2) 26 – 30 (3) 31 – 35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,
4	University	State university (1) Private university (2)	2	Q8, Q16

Table 5 DIF on scale item for gender

Item	Gender	DIF measure	DIF contrast	*t*	*p*
Q10	1	1.31	0.56	2.83	0.00
	2	0.74			
Q11	1	-0.01	0.57	3.50	0.00
	2	-0.59			

Table 6 DIF on scale item for gender

Item	University	DIF measure	DIF contrast	*t*	*Probability*
Q8	4	-0.23	0.60	3.72	0.00
	2	-0.83			
Q16	4	-1.05	0.66	3.78	0.00
	2	-1.71			

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be

more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast > 0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15%, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items (N=10) were considered difficult to respond (Logit value > 0.00), and few items were regarded as easy (N=4). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society. This could be influenced, among other things, by perceptions of discrimination by educational institutions (Richardot & Bureau, 2020) but on the other hand, the participants, all of whom have religious backgrounds and tend to be religious fundamentalists, still hold that homosexuality is unnatural and not accepted in Indonesia.

It is critical to highlight that many scale items had potential DIF in reference to the participants' demography aspects. Particularly, potential DIF was observed on many items related to the participants' age ($N_{DIF} = 14$) and their study program ($N_{DIF} = 9$). The findings indicate the need to modify the classification of age and the study program. The large age difference is due to the participants coming from four levels of education which have different age ranges, namely from the Diploma program, Bachelor's Program, Master's Program and Doctoral Program. Social factors in the form of sexual orientation, gender and socio-economic status (Elk, 2021), cultural factors can also influence this because participants come from various different ethnicities (Elk, 2021) spread throughout Indonesia. Related to the participants' gender and university, for example, findings of the current study revealed that female students had more negative views than the male participants. This finding does not correspond to the earlier study suggesting that male people tend to be more tolerant concerning homosexuality than their female counterparts (see Larsen et al., 1980). This may be because many people's culture in Indonesia still adheres to heteronormativity which assumes heterosexuality to be moral, safe and a natural norm (Moore, 2017). In addition, students from state universities tend to be supportive to homosexuals than those in private universities, but they had negative views about homosexuality when it was associated with AIDS. To overcome this DIF in the future, it is necessary to retest with a larger group of variants so that cultural differences can be reduced and cross-cultural validity becomes greater.

The psychometric analysis in the current study also has revealed that the reliability of the homophobia scale was in the acceptable range (Cronbach's alpha = 0.79). However, such reliability remained lower than one reported in the earlier study (i.e. Klamen et al., 1999; Moral-de la Rubia et al., 2015). It is important to highlight the distinct between the homophobia scale properties assessed in the current study and the scale in the earlier studies. The homophobia scale proposed by Klamen et al. (1999) comprised 12 items with four alternative responses. In addition, in their study, Moral-de la Rubia et al. (2015) selected only 8 of 12 items on the homophobia scale and modified the alternative into seven responses. These differences may explain the discrepancy of the reliability score between the two homophobia scales and the different contexts of the study participants. The differences in responses to several items asked to participants, such as questions Q2 and Q10, provide quite significant differences in the reliability scores in this study. The different responses of participants from Indonesia can be influenced by discrimination factors by religious institutions and educational institutions (Richardot & Bureau, 2020) which are unique characteristics of participants in Indonesia who come from religion-based universities. Nevertheless, despite the person reliability result, the item reliability has shown satisfactory result, revealing the excellent reliability level ($\alpha > 0.90$). This excellent item reliability has suggested that the homophobia scale possesses an excellent internal consistency (see You et al., 2020).

Conclusions and recommendation for further research

Overall, the assessment of the homophobia scale using the data from religion-based university students suggests that the scale possesses sufficient psychometric properties and reveals promising construct validity for use among students in Indonesia. However, the psychometric assessment of the homophobia scale in the current study has limitations. In the study, we assume that students had sufficient motivation to respond to all the given statements. We also thought that students might have comprehended all statements very well and provided their honest responses. Despite the fact that about 34.9% of data were considered outliers from the initial sample of 327 participants. Since the current study involved students from religion-based universities, some other variables related to their religion, both perception and practices, might have interfered with their responses. Further validation study thus should consider the participants' background of religion, perspective and practices.

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3. Bukti komentar review 1 dan 2 terhadap revisi manuskrip pertama

(11 Juni 2024)

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

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Editor and Reviewer comments:

Reviewer #1: Dear Authors,

I have completed the review of your submitted manuscript. I valued the opportunity to review a study with such a relevant and significant focus within the educational and cultural context of Indonesia.

Since expanding the sample is not viable in this context, I recommend that you strengthen the discussion of the limitations associated with the current sample and consider the following points to enrich the depth and impact of your study:

Deepening the Discussion of Limitations

Sample Homogeneity: It is essential that you discuss how the homogeneity of the sample (students from religious universities) might influence the results. Please explain in detail how this characteristic limits the generalization of the results to other university or population contexts.
Cultural and Religious Influence: Delve into how specific cultural and religious norms in Indonesia may have shaped the participants' responses and what this means for the interpretation and external validity of the findings.
Potential Biases in Responses: Consider discussing how attitudes towards homosexuality, potentially influenced by the conservative religious environment, might have biased the responses. Reflect on how this affects the reliability and validity of the homophobia scale used.
Updating the Literature Review

Inclusion of Recent Studies: Ensure to incorporate updated references to support your discussions and conclusions. This will not only strengthen the theoretical base but also situate your research within the current global context.
International Compararies: Although you cannot expand the sample, it would be useful to discuss how your results compare with studies conducted in similar contexts around the world. This can help contextualize the results and explore their international relevance.
Methodological Improvements

Details of the DIF Analysis: Explain more detailedly the analysis of differential item functioning (DIF) and how these findings influence the interpretation of the results. This is crucial to understand the applicability of the scale across different subgroups within your sample.
These recommendations have been proposed to help maximize the contribution of your study to the existing literature. A more robust discussion of these areas will not only strengthen the scientific integrity of the manuscript but also improve its relevance and applicability.

I appreciate the opportunity to review this study and hope that my comments are useful for your revision. I am available for any further queries you may wish to make.

My final recommendation is MAJOR REVISION.

Sincerely,

David Pérez Jorge

Reviewer #2: The article should be better structured. The wording is complex and a revision of the language is recommended. For example, the use of punctuation is inadequate in some parts of the text (page 6). Some of the bibliographic references are very old (e.g., Larsen et al., 1980). An update of the bibliographical references is recommended.
In relation to the theoretical framework, a more precise contextualization of Indonesia should be made, how homosexuality is valued in this country (e.g., if there is specific legislation on the subject). In this section, much space is devoted to analyzing the type of analysis to be carried out, but the object of study is not described in detail.
Conclusions are scarce; the implications derived from the results should be analyzed in detail. Instead, the analysis carried out continues to go into greater depth.
With these considerations, I believe that the article does not meet the objective it pursues (i.e., to analyze student attitudes) but rather to reflect on the strengths of the methodology used. Therefore, it is suggested that the object of study be revised and that there be coherence between this object and the results and conclusions presented.

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Novi Andayani Praptiningsih, Herri Mulyono, Benni Setiawan, Silvie Mil, Syaiful Rohim

Abstract

This study aims to evaluate the psychometric properties of the homophobia scale in students attending religion-based universities in Indonesia. This research is important as homosexuality is a controversial issue in the country and is still a topic of debate. The Homophobia Scale is a tool that assesses attitudes towards homosexuality through 17 items measuring positive affirmation, negative cognition, and the perceived threat of homosexual behavior. The scale was adapted for the Indonesian context, which is predominantly religious, based on The Heterosexual Attitudes Towards Homosexuality (HATH) Scale and Items, originally translated by bilingual experts. The translated scale was then reviewed for content by psychologists and communication experts, and field-tested for reliability and validity. Data from 327 students aged 18-35 from both state and private religion-based universities were analyzed using Rasch model analyses, including principal component analysis (PCA), reliability analysis, and differential item functioning (DIF) assessment. The study found that the homophobia scale accounted for 42.4% of the raw variance, indicating its unidimensionality. The scale demonstrated an acceptable level of personal reliability and excellent reliability for individual items. Results revealed significant demographic effects, with age and study program showing more differential item functioning (DIF). Male students were more tolerant towards homosexuals than females. Additionally, students at state universities tended to be more tolerant, but held negative views of homosexuality when associated with AIDS. In conclusion, the homophobia scale assessed in this study exhibits promising construct validity and sufficient psychometric properties. The findings indicate that negative stigma towards homosexuals and homophobia still persist among students at religion-based universities in Indonesia, despite limited interaction with homosexuals

Keywords: homophobia; religion-based universities; Rasch analysis, psychometric assessment, psychometric properties

Introduction

The stigmatization of homosexuals among university students has been well documented in the literature. For instance, a study by Kite and Bryant-Less (2016) has shown that many homosexual students received discrimination acts from peers with different sexual orientations. Likewise, Winberg et al. (2019) demonstrated that the stigmatization of homosexuals resulted in North American students using phrases such as "That's so gay!" and "No homo!" as negative expressions, implying that being homosexual is inferior to being heterosexual. In Mexico, the rejection percentage towards homosexuals among undergraduate students had reached 18% with 3% extreme rejection (Moral de la Rubia & Valle de la O, 2014). In African universities, many homosexual students were reported to experience stigmatization by usually being labeled as sinners, satanic, or 'demon-possessed' (Mavhandu-Mudzusi, 2017). Mavandu-Mudzusi (2017) also described that stigmatization and discrimination happened almost everywhere on campus, including in lecture halls at the university or other areas such as student residential areas and sports grounds.

The term "homophobia" was first coined by George Weinberg in 1967 to describe the negative stigmatization, discrimination, or rejection towards people with a homosexual orientation (Morris, 2019). It is characterized by irrational condemnation of homosexuals,

including acts of violence, deprivation, and separation and Weinberg viewed homophobia as a form of mental illness. Homophobia refers to the negative emotions, attitudes, and behaviors directed towards individuals with different sexual orientations, such as lesbian, gay, bisexual, and transgender individuals, (Beydağ & Alp Dal, 2022) and Kimmel (2017) specifically links homophobia to behavior and sexual acts related to homosexual men. Another definition states that homophobia is a tendency to discriminate against homosexuals through psychological and social aversion, in some cases manifested in the form of acts of violence against them (Ciocca et al., 2015)

The intensity and level of homophobia in society depends on public awareness regarding the significance of the number of homosexuals in society which is becoming more prominent from time to time (Morris, 2019). Research conducted by Alfred Kinsey and colleagues in the late 1940s and early 1950s further increased awareness that 13% of men and 7% of women had homosexual tendencies (Spiegelhalter, 2015). Many people reject homosexuals based on their personal beliefs, saying that homosexuality is unacceptable in their society (Barragán-Medero & Pérez-Jorge, 2020). This leads to isolation, verbal harassment, insults, slurs, threats of harm, and even physical abuse, particularly among university students (Allen, 2019; Mathies et al., 2019). This behavior reflects homophobia, which involves harmful actions as a way to justify disliking people with different sexual preferences. Research shows that those who believe sexual orientation is a "choice" tend to be less tolerant of homosexuality compared to those who believe it is beyond an individual's control. Similarly, individuals who have interacted with lesbian or gay individuals tend to have more positive attitudes towards homosexuals than those who have not had such interactions (Kimmel, 2017)

In his study, Fyfe (1983) demonstrates that homophobia can manifest at three different levels: 1) cultural homophobia, which seeks to uphold traditional gender roles in conservative perspectives; 2) homophobic attitudes, which encompass a series of consistently negative attitudes toward homosexuals; 3) homophobia as a personality trait correlated with rigidity, authoritarianism, conservatism, and an intolerance of ambiguity and deviation. The preservation of conservative gender norms in culture is influenced by cultural norms upheld by religion (Wilets, 2016). However, religion is not always the primary influence shaping homophobic behavior (Schulte & Battle, 2004) and in some cases, does not contribute to homophobic attitudes at all (Wilets, 2016). While it is true that religion often strengthens or endorses positive attitudes toward homosexual qualities, it's essential to note that "religion" and "homophobia" are not synonymous. Negative attitudes towards homophobia are evident in the form of derogatory remarks and acts of violence stemming from animosity towards gays and lesbians (Odenbring & Johansson, 2021).

The level and intensity of homophobia in society depends on public awareness of the existence of homosexuals in a population, and this awareness has greatly increased during the twentieth century (Morris, 2019). Several studies have been conducted to measure attitudes towards homosexuals towards gays and lesbians. A cross-sectional study of medical students from 12 universities in Peru stated that male chauvinist students were more homophobic than female students. This discrepancy is influenced by several factors, including the fact that women are generally more tolerant, study in the capital, adhere to the Catholic religion and have prior knowledge of and interaction with homosexuals (Nieto-Gutierrez et al., 2019). 2019).

Homophobia can be measured using several methods (Fraïssé & Barrientos, 2016). In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes toward a diverse set of topics. However, other research found that Smith did not clearly describe the H-scale he developed and did not provide a threshold for categorization. In 1984, Herek developed the concept of “sexual prejudice”

which describes negative attitudes towards homosexuality. In this sexual prejudice, the attitudes and behaviors that emerge are hostile to homosexuals. Herek developed an instrument to evaluate two aspects of rejection toward gay men and rejection toward lesbians. Herek's instrument, the 'Attitudes Towards Lesbians and Gay Men (ATLG),' evaluates rejection towards gay men and lesbians through 20 items. This scale assesses attitudes and comfort levels when interacting with homosexual individuals in various social situations (Moral de la Rubia & Valle de la O, 2014). The ATLG is widely used and validated in various contexts in different countries (Herek & McLemore, 2013) However, it does not seem to provide a good fit for data from Latin American countries.

There are some homophobia scales that have been developed. The first one is by Ricketts & Hudson, called the Attitude Index towards Student Homophobia behavior (HBBS) (Siebert et al., 2009). It consists of 25 items and measures homophobia attitudes. Some items use negative wording to offset potential response bias. Scores on this scale range from 0 to 100, with scores above 50 indicating increasingly homophobic attitudes. The scale reportedly has a Cronbach's Alpha of 0.90. The second scale, developed by Van de Ven, Bornhodt, and Bailey in 1996, measures students' responses to gay and lesbian behavior in social and classroom settings (Dinkel & Patzel, 2007). This scale uses a Likert type with ten items, allowing the ranking of intents on five levels from definitely false to absolutely true. The score range for this scale is also 0-100, with a higher score indicating a more negative intention to behave towards homosexuals. The reliability of this scale is reported with a Cronbach's alpha of 0.81. However, this study has limitations, including the inability to compare the results with previous investigations due to the relatively small sample size, which limits statistical analysis, and the lack of similar research among nursing students. Nonetheless, overall, this scale is considered acceptable and usable.

A scale to measure homophobia was developed by conducting factor analysis on responses to statements regarding attitudes towards lesbians and gays. The analysis involved 72 US Marine Corps Reserve members (Estrada, 2002). The results revealed four contributing factors - trust, comfort, acceptance, and threat. There are 14 items in the scale that measure attitudes towards homosexuals in the military, and a Likert scale ranging from strongly agree (1) to strongly disagree (4) is used. Individual scores range from 14 (indicating a very negative attitude) to 56 (indicating a very positive attitude), and the scale's Cronbach's alpha ranges from 0.63 to 0.78. However, the scale has limitations due to its small sample size, exclusive focus on male participants, and concentration on young marines in the Reserve Corps. This necessitates further research for broader applicability. Another study involved adapting and testing the HBBS (Herek's Homophobia Behavior Scale) for reliability and validity in Chile (Cárdenas & Barrientos, 2008). 152 volunteers from introductory undergraduate programs in psychology and economics participated in this study. The scale includes social and demographic measures such as socioeconomic level, religion, sexual orientation, political categorization, and ethnic minorities, as well as variables related to power and intimacy. The results of the measurement indicate the scale's validity and realism, with a Cronbach's alpha of 0.90. However, it is acknowledged that participants may not always feel comfortable expressing their attitudes in public, which could lead to improved impressions. To address this, further research is recommended to develop indirect (non-reactive) measurements that provide insight into people's internal states and attitudes.

The purpose of this study was to evaluate the psychometric properties of the homophobia scale using data from religion-based universities. The Rasch model analysis method was used to objectively assess the validity and reliability of the scale. This method simultaneously evaluates the suitability of both people and items. The analysis included principal component analysis (PCA), reliability analysis, and the assessment of differential item functioning (DIF). The Rasch model is a one-parameter item-response model that helps

researchers assess the difficulty level of items and the ability of respondents to answer questionnaire items (Ben, 2020). In the Rasch model analysis, the ordinal survey data were assessed as frequencies and interpreted as odds probabilities. Previous studies obtained scores for homophobia constructs by summing numerical values across scale items (Moral-de la Rubia et al., 2015). However, summing item responses may raise concerns because the assumption of equal distance between categories for all participants is uncertain for ordinal data (DiStefano & Jiang, 2020). Instead, using the Rasch measurement allows researchers to convert odds probabilities into equal interval types for each scale unit (Boone et al., 2014, 2016). This approach ensures reliable and objective measurements, assessing the relationship between item difficulty and respondent ability under the same interval (Rusland et al., 2020). The Rasch model was chosen for its capability to evaluate latent traits (Colledani et al., 2020) and provide invariant measurement characteristics across various contexts.(Yu, 2020)

Method

Sample

The data for the analysis in the current study were collected from two cohorts of students in Indonesia: those from state religion-based universities and those from private religion-based universities. A total of 327 students participated using non-probability sampling methods, with 98 students from state religion-based universities and 229 students from private religion-based universities. The majority of the students identified as Muslim (N=322), while a small number identified as Protestant (N=4) or Buddhist (N=1).

Sample homogeneity is an important issue in this research because a homogeneous sample will not cause outliers and bias in the data. The data in this research group shows no differences in either the average value or variance compared to other groups in the data set. The participants in this research are students currently enrolled at a religion-based university at any level of education - diploma, bachelor's, master's, or doctoral degrees. These students have provided verbal consent, which has been digitally registered prior to the survey.This characteristic limits the generalization of the results to the university context and other populations due to the relationship between the experiences of the research subjects and the variables in this study. Specifically, in the context of this study, it pertains to the religious background of the research subjects. The religious background could influence how the sample completes the homophobia questionnaire in this study. In addition to religion, homophobia is also impossible to analyze without referring to cultural norms related to gender and race (Wilets, 2016).

In the participant demographic table, participants' socio-demographics are explained based on gender, age, study program, and university of origin to clarify the participant's condition. A more detailed demography of the participants is described in the following Table 1.

Table 1 Demography of the participants

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21 – 25	112	34.3
	26 – 30	15	4.6
	31 – 35	2	0.6
	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Private university	229	70.03

Data collecting instrument and procedure

The research protocol for the data-collecting procedure was approved by the authors' university ethics committee. The data-collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999a), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. This instrument was chosen in this study because the items in this study are appropriate to the context of society in Indonesia where many participants still have conservative and fundamentalist views of religion and include elements of associated risk. with health (Klamen et al., 1999). The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age, and the study program that students took at the time of the survey to clarify the sociodemographic conditions of participants. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree (score = 5), agree (score = 4), neutral (score = 3), disagree (score = 2), and strongly disagree (score = 1). Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (Klamen et al., 1999b). After the ethics clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. Student participation was voluntary, and informed consent was based on information, participant confidentiality, and potential risks arising from research collected prior to data analysis. Data collection was carried out through an online survey using Google Forms so that it was effective considering that participants came from all regions of Indonesia and also made it easy to fill in so it didn't take too long. The questionnaire distributed explains the purpose of the research and the rights that participants have while participating in the research.

Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principal Component Analysis (PCA), the analysis of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1 application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (Ben, 2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items. Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020). In Rasch everything can be predicted so that we can assess the psychometric properties of the homophobia scale more objectively.

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit

the Rasch analysis because their logit values were observed beyond the threshold -2 and +2 (Huang et al., 2020). Linacre (Linacre, 2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

Result

Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2 Students responses to Homophobia scale items

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	-0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	-1.10	0.08
Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	-0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	-0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	-0.42	0.07
Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	-0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	-1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE=standard of error

Table 3 Descriptive statistics for person and item

	Person statistics (N=213)		Item statistics (N=17)	
	Total score	Logit	Total score	Logit
Min	25.0	-2.20	401.0	-1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	-0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at -0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Figure 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

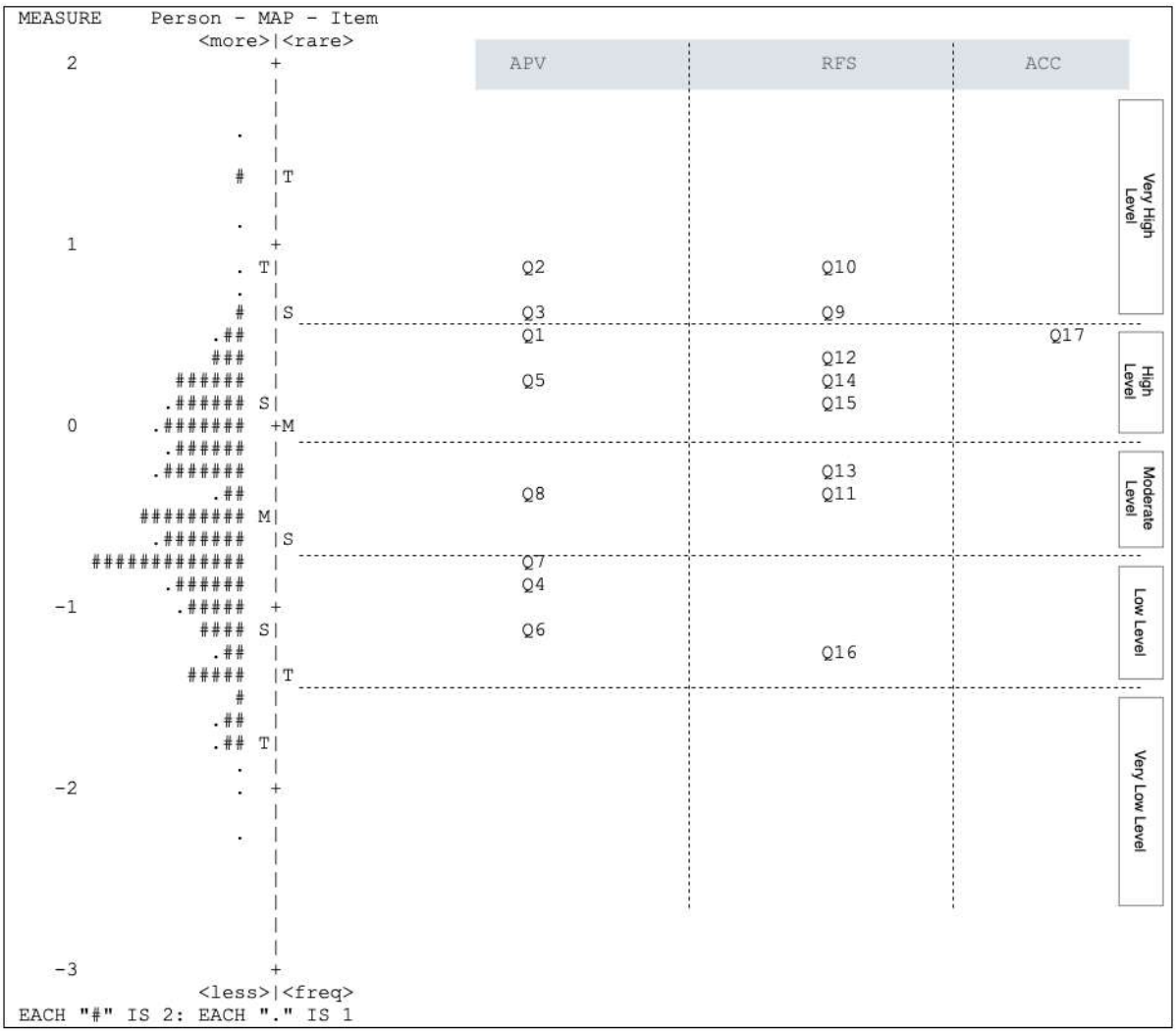

Fig 1. Wright person-item map (N= 213).

"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\,G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1-8, Refusal (RFS): Q9-16, Acceptance (ACC): Q17)

Evaluation of Rasch PCA

Rasch PCA analysis was carried out to test the assumption of unidimensionality of the homophobia scale which states that (1) the easier the question, the more likely participants are to respond to the homophobia scale correctly, and (2) the greater the ability of participants, the greater the possibility they answered questions on the homophobia scale correctly. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20% (the global scale=42.4%, the Approval subscale=55.0% and Refusal subscale=48.2%). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level ($\alpha > 0.90$), and the reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

Differential Item Functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Table 5 and Table 6 exemplifies the DIF on gender and university demography, respectively.

Table 4 Potential DIF on the scale item

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21 – 25 (2) 26 – 30 (3) 31 – 35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,

4	University	State university (1) Private university (2)	2	Q8, Q16

Table 5 DIF on scale item for gender

Item	Gender	DIF measure	DIF contrast	*t*	*p*
Q10	1	1.31	0.56	2.83	0.00
	2	0.74			
Q11	1	-0.01	0.57	3.50	0.00
	2	-0.59			

Table 6 DIF on scale item for gender

Item	University	DIF measure	DIF contrast	*t*	*Probability*
Q8	4	-0.23	0.60	3.72	0.00
	2	-0.83			
Q16	4	-1.05	0.66	3.78	0.00
	2	-1.71			

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast > 0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15%, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items (N=10) were considered difficult to respond (Logit value > 0.00), and few items were regarded as easy (N=4). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society. This could be influenced, among other things, by perceptions of discrimination by educational institutions (Richardot & Bureau, 2020) but on the other hand, the participants, all of whom have religious backgrounds and tend to be religious fundamentalists, still hold that homosexuality is unnatural and not accepted in Indonesia. In their view, homosexual behavior

is considered a toxic relationship that can poison the behavior of those around them to follow their lifestyle as a gay person (Praptiningsih et al., 2020, 2024).

This contrasts with the results of a study in Chile, where traditional values, social sanctions, and social rights are the three factors that contribute to the structural factors in the measurement of The Attitudes Toward Lesbians and Gay Men Scale (ATLG) (Cárdenas & Barrientos, 2008)

The religious background of the sample group strongly influenced their view on homosexuality and homophobia. For example, out of 329 participants, 322 had a Muslim background, which correlated with their attitudes. This relationship between religiosity and homophobia was also observed among undergraduate students, as reported by Wilkinson (2004). In Indonesia, Islam and Christianity strictly prohibit homosexuality, while Hinduism, Buddhism, and Confucianism lenient stance. This has a significant effect on homophobia, as supported by Balkin et al (2009) who found that religious beliefs are a significant predictor of prejudice in homophobia. Although there is a relationship between religion and homophobia, religion itself is not always the main agent that constitutes homophobia behavior and sometimes does not contribute to homophobia at all (Wilets, 2016). A study in Ghana has shown that the media stimulates and perpetuates homophobia and heterosexism. The media is also used as a platform for politicians to gather support for reactionary interventions against homosexuality (Tettey, 2016). Additionally, the teachings of the religions in Indonesia, such as Islam, Christianity, Hinduism, Buddhism, and Confucianism, also promote tolerance towards fellow human beings. This implies that individuals with a sexual orientation disorder, such as homosexuals, still have the right to live their lives well, and religious adherents should respect them by giving them the same opportunities as other people to engage in activities related to the economy, health, and education, irrespective of their sexual orientation.

It's crucial to note that several scale items showed potential differential item functioning (DIF) based on participants' demographic characteristics. Specifically, potential DIF was identified in many items related to participants' age (NDIF = 14) and their study program (NDIF = 9). These findings suggest the need to revise the classification of age and study programs. The wide age range is attributed to participants coming from different levels of education—Diploma program, Bachelor's Program, Master's Program, and Doctoral Program—each with its own age range. Other research in nursing students at Midwestern University indicates that Midwestern culture has an impact on attitudes toward homophobia, as it does not support LGBT individuals (Dinkel & Patzel, 2007). Social factors such as sexual orientation, gender, and socio-economic status (Elk, 2021), as well as cultural factors influenced by participants' various ethnicities (Elk, 2021) across Indonesia, could also play a role.

Regarding the participants' gender and university, the study found that female students had more negative views than the male participants, which contradicts previous studies suggesting that males tend to be more tolerant of homosexuality than females. This may be due to the prevailing heteronormativity in Indonesian culture, which view heterosexuality as the moral, safe and a natural norm (Moore, 2017). Additionally, students from state universities tended to be more supportive to homosexuals than those in private universities, but they had negative views about homosexuality when it was associated with AIDS. To address these DIF in the future, it is necessary to retest with a larger group of participants to minimize cultural differences and enhanced cross-cultural validity.

The psychometric analysis of the current study indicates that the homophobic scale is acceptable (Cronbach's alpha = 0.79). However, this reliability is lower than that reported in previous studies (Ciocca et al., 2015; Moral-de la Rubia et al., 2015). It's important to note that there are differences in the traits of the homophobic scale assessed in this study compared

to the scale in previous studies. For instance, (Moral de la Rubia & Valle de la O, 2014) selected only 8 out of 12 items on the homophobia scale and modified the alternatives into seven responses, while Ciocca et all (2015) had 25 items with three factors associated with homophobia, namely behavior/negative affect, affect/behavioral aggression and negative cognition. This difference explains the variance in reliability scores between these scales and the difference in the context of the study participants. The variation in responses by participants, particularly in questions such as Q2 and Q10, significantly impacts the reliability scores in this study. The different responses of the participants from Indonesia may be influenced by discriminatory factors carried out by religious institutions and educational institutions (Richardot & Bureau, 2020), especially given that the participants in Indonesia come from faith-based universities. Nevertheless, despite the variability in per-person reliability results, the item's reliability has shown satisfactory results, demonstrating an excellent level of reliability ($\alpha > 0.90$), slightly lower than the study conducted by Ciocca (2015) (Cronbach's α coefficient of 0.92). Thus, the excellent reliability of this item suggests that the homophobic scale has excellent internal consistency (You et al., 2020).

Conclusions and recommendation for further research

The level of homophobia in Indonesia is closely linked to the acceptance of the LGBT community. The background of the participants, whether they are students from state religion-based universities or private religion-based universities, has an influence on the results of the measurement of this homophobia scale. The religious and cultural teachings that prevail in Indonesia play an important role in shaping these attitudes. Some students still perceive homosexuality as deviant behavior, but they display positive behavior to support the rights of homosexuals to interact and participate in social life. However, the assessment of the homophobia scale has some limitations. It's important to expand the type and scope of assessment to allow for wider generalization. Research on this topic has only just begun in Indonesia, so the data reported here should be considered as a starting point.

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5. Bukti komentar reviewer 1 dan 2 terhadap revisi manuskrip kedua

(8 Juli 2024)

Uhamka
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

Novi Andayani Praptiningsih <novi.ap@uhamka.ac.id>

Decision on submission to Acta Psychologica

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Acta Psychologica <em@editorialmanager.com> Mon, Jul 8, 2024 at 5:12 PM
Reply-To: Acta Psychologica <support@elsevier.com>
To: Novi Andayani Praptiningsih <novi.ap@uhamka.ac.id>

Manuscript Number: **ACTPSY-D-23-00741R2**

Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Dear Dr Praptiningsih,

Thank you for submitting your manuscript to Acta Psychologica.

I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following major revision. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by **Aug 07, 2024**.

When revising your manuscript, please consider all issues mentioned in the reviewers' comments carefully: please outline every change made in response to their comments and provide suitable rebuttals for any comments not addressed. Please note that your revised submission may need to be re-reviewed.

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Acta Psychologica values your contribution and I look forward to receiving your revised manuscript.

Kind regards,
Cameron Peers
Action Editor

Acta Psychologica

Editor and Reviewer comments:

Reviewer #1: Dear Authors,
Thank you for the effort you put into writing this manuscript. Overall, it presents a relevant and well-structured study

evaluating the psychometric properties of the homophobia scale in students from religious-based universities in Indonesia.
The study appropriately uses the Rasch model for data analysis, providing a solid basis for validating the scale in this context. The inclusion of DIF analysis is a strong point, showing how different demographics respond to the scale items. The results section is well-organized and presents the data clearly and systematically.
Aspects to Improve
1. Justification of the Study
-Observation: Although the controversy over homosexuality in Indonesia is mentioned, the justification for the study could be more robust and more detailed.
-Recommendation: Detail why this study is crucial in the Indonesian context, providing specific examples of how the results can impact local policies and practices.
2. Clarification in Methodology
-Observation: The explanation of why the Rasch analysis was chosen over other possible statistical approaches is superficial.
-Recommendation: Explain in more depth the choice of Rasch analysis and its comparison with other statistical methods, highlighting its specific advantages for this study.
3. External Validity
-Observation: The homogeneity of the sample and its possible impact on the study's external validity are not sufficiently discussed.
-Recommendation: Expand the discussion on how the homogeneity of the sample can affect the generalization of the results to other populations.
4. Interpretation of Results
-Observation: The interpretation of the results, especially regarding gender differences and the association with AIDS, is superficial.
-Recommendation: Provide a richer and more contextualized interpretation of the findings, including a summary of the key results at the end of the results section.
5. Depth in Discussion
-Observation: The discussion could delve deeper into the implications of the findings and how they can influence future policies and educational practices.
-Recommendation: Expand on the practical implications and future research directions, providing specific examples of how the findings can improve policies and practices in religious universities.
6. Practical Recommendations
-Observation: There is a lack of specific recommendations on how to use the study's results.
-Recommendation: Include concrete suggestions for educators and policymakers on how the study's findings can be implemented to address homophobia in religious universities.
7. Ethical Aspects
-Observation: Although it is mentioned that informed consent was obtained, a detailed explanation of the ethical procedures is lacking.
-Recommendation: Provide more details on how the confidentiality and anonymity of the participants were ensured, and include a clear statement about the approval of the ethics committee and any associated reference number.

Conclusion
The manuscript presents a valuable contribution to the study of attitudes towards homosexuality. I believe that the suggested improvements will strengthen the clarity and depth of the findings and help improve the quality of the manuscript.
Best regards,
David Pérez Jorge

Reviewer #2: n the revision of the paper some of the requested changes have been introduced, e.g. an explanation of homosexuality in Indonesia. This commentary contributes to a better interpretation of the results presented. Some of the bibliographical references have also been updated. However, there are some issues that should be analysed. In the conclusions section it is mentioned "This implies that individuals with a sexual orientation disorder, such as homosexuals". Does this refer to the perception of homosexuality by the different religions practised in Indonesia? This should be clarified because it may seem to be the opinion of the research team on homosexuality. Also, the Yogyakarta Principles that promote guaranteeing the rights of the LGBT community should be discussed. The implications of the results have also not been reflected upon. Given the level of homonegativity found, what should the universities involved in this research do, and what are the implications for LGBT students? This recommendation on further reflection on the consequences has not been developed.

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To: silviesahara@uhamka.ac.id

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6. Bukti komentar reviewer 1 dan 2 terhadap revisi manuskrip ketiga, serta artikel yang diresubmit (13 Agustus 2024)

Uhamka
UNIVERSITAS MUHAMMADIYAH PROF. DR. HAMKA

Novi Andayani Praptiningsih <novi.ap@uhamka.ac.id>

Decision on submission to Acta Psychologica

2 messages

Acta Psychologica <em@editorialmanager.com> Tue, Aug 13, 2024 at 5:01 PM
Reply-To: Acta Psychologica <support@elsevier.com>
To: Novi Andayani Praptiningsih <novi.ap@uhamka.ac.id>

Manuscript Number: **ACTPSY-D-23-00741R3**

Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Dear Dr Praptiningsih,

Thank you for submitting your manuscript to Acta Psychologica.

I have completed my evaluation of your manuscript. The reviewers recommend reconsideration of your manuscript following major revision. I invite you to resubmit your manuscript after addressing the comments below. Please resubmit your revised manuscript by **Sep 12, 2024**.

When revising your manuscript, please consider all issues mentioned in the reviewers' comments carefully: please outline every change made in response to their comments and provide suitable rebuttals for any comments not addressed. Please note that your revised submission may need to be re-reviewed.

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Acta Psychologica values your contribution and I look forward to receiving your revised manuscript.

Kind regards,
Cameron Peers
Action Editor

Acta Psychologica

Editor and Reviewer comments:

Reviewer #1: The authors have addressed all the major comments and suggestions from the reviewers. The revisions made are adequate and have significantly improved the manuscript. Based on the detailed responses and changes made,

I recommend that the manuscript is now suitable for publication without the need for further major revisions.

Best regards,

Reviewer #2: n the revision of the paper changes have been introduced. However, the text is full of stereotypes (i.e. "Additionally, promiscuous sexual behavior among LGBT individuals poses a risk of HIV/AIDS transmission, contradicting Indonesia's national education goals and religious university education" or "Additionally, steps can be taken to prohibit dress that does not align with gender norms, as this may cause discomfort for students" or "The results of the homophobia measurement also form the basis for decision-making regarding policies to protect the rights of heterosexual students from LGBT behavior and lifestyle by applying religious values, in order to create a conducive academic environment and religious climate that shapes students into a straight man"). I believe that these prejudices violate the rights of LGBT people. Furthermore, the idea of sexual orientation disorder shiuld be specified as indiczted in the previous review.

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Novi Andayani Praptiningsih, Herri Mulyono, Benni Setiawan, Silvie Mil, Syaiful Rohim

Abstract

This study aims to evaluate the psychometric properties of the homophobia scale in students attending religion-based universities in Indonesia. This research is important as homosexuality is a controversial issue in the country and is still a topic of debate. The Homophobia Scale is a tool that assesses attitudes towards homosexuality through 17 items measuring positive affirmation, negative cognition, and the perceived threat of homosexual behavior. The scale was adapted for the Indonesian context, which is predominantly religious, based on The Heterosexual Attitudes Towards Homosexuality (HATH) Scale and Items, originally translated by bilingual experts. The translated scale was then reviewed for content by psychologists and communication experts, and field-tested for reliability and validity. Data from 327 students aged 18-35 from both state and private religion-based universities were analyzed using Rasch model analyses, including principal component analysis (PCA), reliability analysis, and differential item functioning (DIF) assessment. The study found that the homophobia scale accounted for 42.4% of the raw variance, indicating its unidimensionality. The scale demonstrated an acceptable level of personal reliability and excellent reliability for individual items. Results revealed significant demographic effects, with age and study program showing more differential item functioning (DIF). Male students were more tolerant towards homosexuals than females. Additionally, students at state universities tended to be more tolerant, but held negative views of homosexuality when associated with AIDS. In conclusion, the homophobia scale assessed in this study exhibits promising construct validity and sufficient psychometric properties. The findings indicate that negative stigma towards homosexuals and homophobia still persist among students at religion-based universities in Indonesia, despite limited interaction with homosexuals

Keywords: homophobia; religion-based universities; Rasch analysis, psychometric assessment, psychometric properties

Introduction

The stigmatization of homosexuals among university students has been well documented in the literature. For instance, a study by Kite and Bryant-Less (2016) has shown that many homosexual students received discrimination acts from peers with different sexual orientations. Likewise, Winberg et al. (2019) demonstrated that the stigmatization of homosexuals resulted in North American students using phrases such as "That's so gay!" and "No homo!" as negative expressions, implying that being homosexual is inferior to being heterosexual. In Mexico, the rejection percentage towards homosexuals among undergraduate students had reached 18% with 3% extreme rejection (Moral de la Rubia & Valle de la O, 2014). In African universities, many homosexual students were reported to experience stigmatization by usually being labeled as sinners, satanic, or 'demon-possessed' (Mavhandu-Mudzusi, 2017). Mavandu-Mudzusi (2017) also described that stigmatization and discrimination happened almost everywhere on campus, including in lecture halls at the university or other areas such as student residential areas and sports grounds.

The term "homophobia" was first coined by George Weinberg in 1967 to describe the negative stigmatization, discrimination, or rejection towards people with a homosexual orientation (Morris, 2019). It is characterized by irrational condemnation of homosexuals,

including acts of violence, deprivation, and separation and Weinberg viewed homophobia as a form of mental illness. Homophobia refers to the negative emotions, attitudes, and behaviors directed towards individuals with different sexual orientations, such as lesbian, gay, bisexual, and transgender individuals, (Beydağ & Alp Dal, 2022) and Kimmel (2017) specifically links homophobia to behavior and sexual acts related to homosexual men. Another definition states that homophobia is a tendency to discriminate against homosexuals through psychological and social aversion, in some cases manifested in the form of acts of violence against them (Ciocca et al., 2015)

The intensity and level of homophobia in society depends on public awareness regarding the significance of the number of homosexuals in society which is becoming more prominent from time to time (Morris, 2019). Research conducted by Alfred Kinsey and colleagues in the late 1940s and early 1950s further increased awareness that 13% of men and 7% of women had homosexual tendencies (Spiegelhalter, 2015). Many people reject homosexuals based on their personal beliefs, saying that homosexuality is unacceptable in their society (Barragán-Medero & Pérez-Jorge, 2020). This leads to isolation, verbal harassment, insults, slurs, threats of harm, and even physical abuse, particularly among university students (Allen, 2019; Mathies et al., 2019). This behavior reflects homophobia, which involves harmful actions as a way to justify disliking people with different sexual preferences. Research shows that those who believe sexual orientation is a "choice" tend to be less tolerant of homosexuality compared to those who believe it is beyond an individual's control. Similarly, individuals who have interacted with lesbian or gay individuals tend to have more positive attitudes towards homosexuals than those who have not had such interactions (Kimmel, 2017)

In his study, Fyfe (1983) demonstrates that homophobia can manifest at three different levels: 1) cultural homophobia, which seeks to uphold traditional gender roles in conservative perspectives; 2) homophobic attitudes, which encompass a series of consistently negative attitudes toward homosexuals; 3) homophobia as a personality trait correlated with rigidity, authoritarianism, conservatism, and an intolerance of ambiguity and deviation. The preservation of conservative gender norms in culture is influenced by cultural norms upheld by religion (Wilets, 2016). However, religion is not always the primary influence shaping homophobic behavior (Schulte & Battle, 2004) and in some cases, does not contribute to homophobic attitudes at all (Wilets, 2016). While it is true that religion often strengthens or endorses positive attitudes toward homosexual qualities, it's essential to note that "religion" and "homophobia" are not synonymous. Negative attitudes towards homophobia are evident in the form of derogatory remarks and acts of violence stemming from animosity towards gays and lesbians (Odenbring & Johansson, 2021).

The level and intensity of homophobia in society depends on public awareness of the existence of homosexuals in a population, and this awareness has greatly increased during the twentieth century (Morris, 2019). Several studies have been conducted to measure attitudes towards homosexuals towards gays and lesbians. A cross-sectional study of medical students from 12 universities in Peru stated that male chauvinist students were more homophobic than female students. This discrepancy is influenced by several factors, including the fact that women are generally more tolerant, study in the capital, adhere to the Catholic religion and have prior knowledge of and interaction with homosexuals (Nieto-Gutierrez et al., 2019). 2019).

Homophobia can be measured using several methods (Fraïssé & Barrientos, 2016). In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes toward a diverse set of topics. However, other research found that Smith did not clearly describe the H-scale he developed and did not provide a threshold for categorization. In 1984, Herek developed the concept of “sexual prejudice”

which describes negative attitudes towards homosexuality. In this sexual prejudice, the attitudes and behaviors that emerge are hostile to homosexuals. Herek developed an instrument to evaluate two aspects of rejection toward gay men and rejection toward lesbians. Herek's instrument, the 'Attitudes Towards Lesbians and Gay Men (ATLG),' evaluates rejection towards gay men and lesbians through 20 items. This scale assesses attitudes and comfort levels when interacting with homosexual individuals in various social situations (Moral de la Rubia & Valle de la O, 2014). The ATLG is widely used and validated in various contexts in different countries (Herek & McLemore, 2013) However, it does not seem to provide a good fit for data from Latin American countries.

There are some homophobia scales that have been developed. The first one is by Ricketts & Hudson, called the Attitude Index towards Student Homophobia behavior (HBBS) (Siebert et al., 2009). It consists of 25 items and measures homophobia attitudes. Some items use negative wording to offset potential response bias. Scores on this scale range from 0 to 100, with scores above 50 indicating increasingly homophobic attitudes. The scale reportedly has a Cronbach's Alpha of 0.90. The second scale, developed by Van de Ven, Bornhodt, and Bailey in 1996, measures students' responses to gay and lesbian behavior in social and classroom settings (Dinkel & Patzel, 2007). This scale uses a Likert type with ten items, allowing the ranking of intents on five levels from definitely false to absolutely true. The score range for this scale is also 0-100, with a higher score indicating a more negative intention to behave towards homosexuals. The reliability of this scale is reported with a Cronbach's alpha of 0.81. However, this study has limitations, including the inability to compare the results with previous investigations due to the relatively small sample size, which limits statistical analysis, and the lack of similar research among nursing students. Nonetheless, overall, this scale is considered acceptable and usable.

A scale to measure homophobia was developed by conducting factor analysis on responses to statements regarding attitudes towards lesbians and gays. The analysis involved 72 US Marine Corps Reserve members (Estrada, 2002). The results revealed four contributing factors - trust, comfort, acceptance, and threat. There are 14 items in the scale that measure attitudes towards homosexuals in the military, and a Likert scale ranging from strongly agree (1) to strongly disagree (4) is used. Individual scores range from 14 (indicating a very negative attitude) to 56 (indicating a very positive attitude), and the scale's Cronbach's alpha ranges from 0.63 to 0.78. However, the scale has limitations due to its small sample size, exclusive focus on male participants, and concentration on young marines in the Reserve Corps. This necessitates further research for broader applicability. Another study involved adapting and testing the HBBS (Herek's Homophobia Behavior Scale) for reliability and validity in Chile (Cárdenas & Barrientos, 2008). 152 volunteers from introductory undergraduate programs in psychology and economics participated in this study. The scale includes social and demographic measures such as socioeconomic level, religion, sexual orientation, political categorization, and ethnic minorities, as well as variables related to power and intimacy. The results of the measurement indicate the scale's validity and realism, with a Cronbach's alpha of 0.90. However, it is acknowledged that participants may not always feel comfortable expressing their attitudes in public, which could lead to improved impressions. To address this, further research is recommended to develop indirect (non-reactive) measurements that provide insight into people's internal states and attitudes.

The purpose of this study was to evaluate the psychometric properties of the homophobia scale using data from religion-based universities. This is an important study because Indonesia is a country where various religions discourage LGBT practices and consider them to be inconsistent with cultural norms. Despite this, there has been a notable increase in the number of individuals openly identifying as gay in Indonesia (Praptiningsih et al., 2020). This trend is concerning, making it important to investigate attitudes toward gay

Commented [NP1]: 1. Justification of the Study
-Observation: Although the controversy over homosexuality in Indonesia is mentioned, the justification for the study could be more robust and more detailed.
-Recommendation: Detail why this study is crucial in the Indonesian context, providing specific examples of how the results can impact local policies and practices.

behavior by measuring levels of homophobia using a scale that is appropriate for Indonesian culture. By assessing the extent of homophobia, the government and other stakeholders can understand attitudes and create policies to ensure that individuals who identify as gay are not subjected to verbal or physical abuse (Boellstorff, 2004). This aims to guarantee that their rights as citizens are respected while also preventing the promotion of a lifestyle that contradicts prevailing cultural and religious norms in Indonesia. The Rasch model analysis method was used to objectively assess the validity and reliability of the scale. The Rasch measurement model is utilized because it enables researchers to place individuals' abilities on the same scale irrespective of the specific survey they complete (M. S. Khine, 2020). With this model, researchers can also evaluate the difficulty of survey items and the respondents' ability to answer those items (Ben, 2020) The results of the Rasch analysis are presented in a Wright Map. On the left side of the map, the position of an item indicates its difficulty level, with lower positions representing easier items and higher positions representing more difficult items. On the right side, individuals with lower response ability are located at the bottom, while those with higher response ability are positioned at the top of the map (Boone et al., 2014, 2016). Rasch modeling allows for the conversion of different item and attribute values into the same scale, known as the logit scale, thereby enabling the listing of items and attributes at the same scale (Yu, 2020) Furthermore, Rasch assessment of ordinal survey data as frequency provides an interpretation of opportunity. This establishes Rasch as a method for ensuring reliable and objective measurements, evaluating the relationship between question difficulty and respondent ability on the same interval (Rusland et al., 2020).

Commented [NP2]: 2. Clarification in Methodology
-Observation: The explanation of why the Rasch analysis was chosen over other possible statistical approaches is superficial.
-Recommendation: Explain in more depth the choice of Rasch analysis and its comparison with other statistical methods, highlighting its specific advantages for this study

Method

Sample

The data for the analysis in the current study were collected from two cohorts of students in Indonesia: those from state religion-based universities and those from private religion-based universities. A total of 327 students participated using non-probability sampling methods, with 98 students from state religion-based universities and 229 students from private religion-based universities. The majority of the students identified as Muslim (N=322), while a small number identified as Protestant (N=4) or Buddhist (N=1).

It is crucial to ensure sample homogeneity in this research, particularly due to the necessity of studying specific sociodemographic characteristics of participants from religion-based universities. By selecting a homogeneous sample, we can avoid outliers and bias in the data. Another benefit of using a homogeneous sample offer narrower but clearer generalizability (Jager et al., 2017). A more homogeneous population is more likely to provide a representative sample. The homogeneity of the sample also influences the generalizability of results to other populations with similar sociodemographic characteristics, as opposed to heterogeneous samples. The data in this research group shows no differences in either the average value or variance compared to other groups in the data set. The participants in this research are students currently enrolled at a religion-based university at any level of education - diploma, bachelor's, master's, or doctoral degrees. These students have provided verbal consent, which has been digitally registered prior to the survey.This characteristic limits the generalization of the results to the university context and other populations due to the relationship between the experiences of the research subjects and the variables in this study. Specifically, in the context of this study, it pertains to the religious background of the research subjects. The religious background could influence how the sample completes the homophobia questionnaire in this study. In addition to religion, homophobia is also impossible to analyze without referring to cultural norms related to gender and race (Wilets, 2016).

Commented [NP3]: 3. External Validity
-Observation: The homogeneity of the sample and its possible impact on the study's external validity are not sufficiently discussed.
-Recommendation: Expand the discussion on how the homogeneity of the sample can affect the generalization of the results to other populations.

In the participant demographic table, participants' socio-demographics are explained based on gender, age, study program, and university of origin to clarify the participant's condition. A more detailed demography of the participants is described in the following Table 1.

Table 1 Demography of the participants

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21 – 25	112	34.3
	26 – 30	15	4.6
	31 – 35	2	0.6
	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Private university	229	70.03

Data collecting instrument and procedure

The research protocol for the data-collecting procedure was approved by the authors' university ethics committee. The data-collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999a), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. This instrument was chosen in this study because the items in this study are appropriate to the context of society in Indonesia where many participants still have conservative and fundamentalist views of religion and include elements of associated risk. with health (Klamen et al., 1999). The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age, and the study program that students took at the time of the survey to clarify the sociodemographic conditions of participants. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree (score = 5), agree (score = 4), neutral (score = 3), disagree (score = 2), and strongly disagree (score = 1). Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (Klamen et al., 1999b). After the ethics clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. The research was conducted with voluntary student participation. Informed consent was obtained, ensuring participant confidentiality and explaining potential research risks. Participant confidentiality is closely related to anonymity (Wiles et al., 2008). In the context of this study, confidentiality means that the researcher does not discuss the information provided by the respondent with others (Wiles et al., 2008) and presents the findings by ensuring that the individual is not identified. (Ong & Weiss, 2000) explicitly. These principles were outlined in the informed consent, which participants agreed to in writing. Data collection was carried out through an online survey using Google Forms so that it was effective considering that participants came from all regions of Indonesia and also made it easy

to fill in so it didn't take too long. The survey was designed to be user-friendly and efficient, providing participants with information about the research purpose and their rights

Commented [NP4]: 7. Ethical Aspects
-Observation: Although it is mentioned that informed consent was obtained, a detailed explanation of the ethical procedures is lacking.
-Recommendation: Provide more details on how the confidentiality and anonymity of the participants were ensured, and include a clear statement about the approval of the ethics committee and any associated reference number.

Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principal Component Analysis (PCA), the analysis of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1 application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (Ben, 2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items. Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020). In Rasch everything can be predicted so that we can assess the psychometric properties of the homophobia scale more objectively.

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit the Rasch analysis because their logit values were observed beyond the threshold -2 and +2 (Huang et al., 2020). Linacre (Linacre, 2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

Result

Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2 Students responses to Homophobia scale items

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	-0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	-1.10	0.08

Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	-0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	-0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	-0.42	0.07
Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	-0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	-1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE=standard of error

Table 3 Descriptive statistics for person and item

	Person statistics (N=213)		Item statistics (N=17)	
	Total score	Logit	Total score	Logit
Min	25.0	-2.20	401.0	-1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	-0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at -0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Figure 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

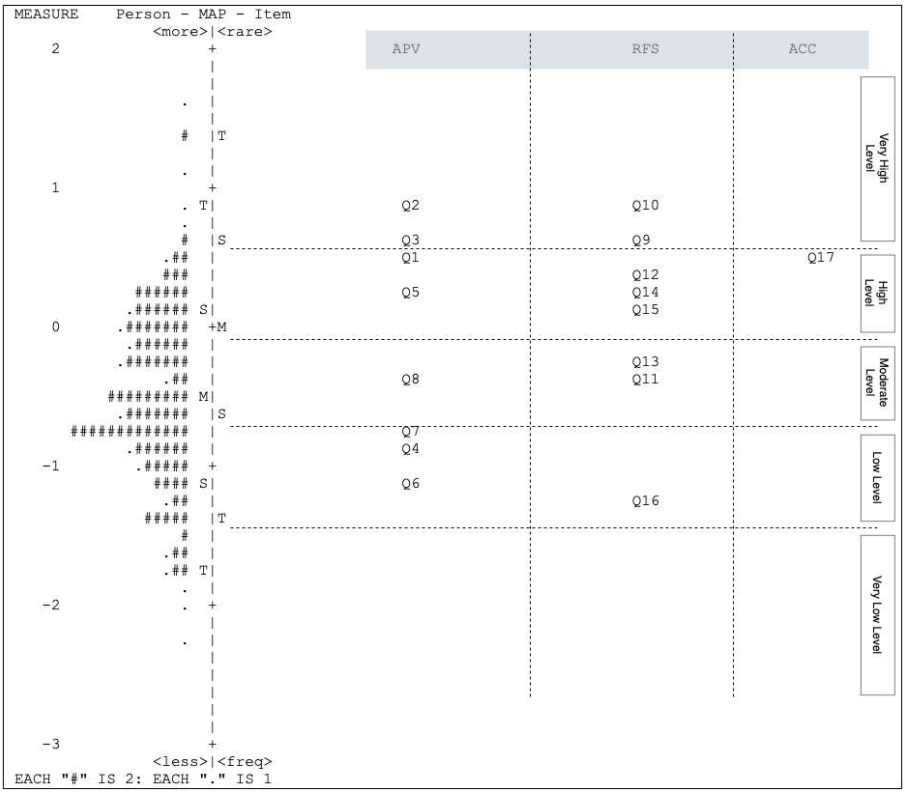

Fig 1. Wright person-item map (N= 213).

"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\,G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1-8, Refusal (RFS): Q9-16, Acceptance (ACC): Q17)

Evaluation of Rasch PCA

Rasch PCA analysis was carried out to test the assumption of unidimensionality of the homophobia scale which states that (1) the easier the question, the more likely participants are to respond to the homophobia scale correctly, and (2) the greater the ability of participants, the greater the possibility they answered questions on the homophobia scale correctly. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20% (the global scale=42.4%, the Approval subscale=55.0% and Refusal subscale=48.2%). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits

continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level ($\alpha > 0.90$), and the reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

Differential Item Functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Table 5 and Table 6 exemplifies the DIF on gender and university demography, respectively.

Table 4 Potential DIF on the scale item

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21 – 25 (2) 26 – 30 (3) 31 – 35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,
4	University	State university (1) Private university (2)	2	Q8, Q16

Table 5 DIF on scale item for gender

Item	Gender	DIF measure	DIF contrast	*t*	*p*
Q10	1	1.31	0.56	2.83	0.00
	2	0.74			
Q11	1	-0.01	0.57	3.50	0.00
	2	-0.59			

Table 6 DIF on scale item for gender

Item	University	DIF measure	DIF contrast	*t*	*Probability*
Q8	4	-0.23	0.60	3.72	0.00
	2	-0.83			
Q16	4	-1.05	0.66	3.78	0.00
	2	-1.71			

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be

more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast > 0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15%, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items (N=10) were considered difficult to respond (Logit value > 0.00), and few items were regarded as easy (N=4). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society. This could be influenced, among other things, by perceptions of discrimination by educational institutions (Richardot & Bureau, 2020) but on the other hand, the participants, all of whom have religious backgrounds and tend to be religious fundamentalists, still hold that homosexuality is unnatural and not accepted in Indonesia. In their view, homosexual behavior is considered a toxic relationship that can poison the behavior of those around them to follow their lifestyle as a gay person (Praptiningsih et al., 2020, 2024). This contrasts with the results of a study in Chile, where traditional values, social sanctions, and social rights are the three factors that contribute to the structural factors in the measurement of The Attitudes Toward Lesbians and Gay Men Scale (ATLG) (Cárdenas & Barrientos, 2008)

The religious background of the sample group strongly influenced their view on homosexuality and homophobia. For example, out of 329 participants, 322 had a Muslim background, which correlated with their attitudes. This relationship between religiosity and homophobia was also observed among undergraduate students, as reported by Wilkinson (2004). In Indonesia, Islam and Christianity strictly prohibit homosexuality, while Hinduism, Buddhism, and Confucianism lenient stance. This has a significant effect on homophobia, as supported by Balkin et al (2009) who found that religious beliefs are a significant predictor of prejudice in homophobia. Although there is a relationship between religion and homophobia, religion itself is not always the main agent that constitutes homophobia behavior and sometimes does not contribute to homophobia at all (Wilets, 2016). A study in Ghana has shown that the media stimulates and perpetuates homophobia and heterosexism. The media is also used as a platform for politicians to gather support for reactionary interventions against homosexuality (Tettey, 2016). Additionally, the teachings of the religions in Indonesia, such as Islam, Christianity, Hinduism, Buddhism, and Confucianism, also promote tolerance towards fellow human beings. This implies that individuals with a sexual orientation disorder, such as homosexuals, still have the right to live their lives well, and religious adherents should

respect them by giving them the same opportunities as other people to engage in activities related to the economy, health, and education, irrespective of their sexual orientation.

It's crucial to note that several scale items showed potential differential item functioning (DIF) based on participants' demographic characteristics. Specifically, potential DIF was identified in many items related to participants' age (NDIF = 14) and their study program (NDIF = 9). These findings suggest the need to revise the classification of age and study programs. The wide age range is attributed to participants coming from different levels of education—Diploma program, Bachelor's Program, Master's Program, and Doctoral Program—each with its own age range. Other research in nursing students at Midwestern University indicates that Midwestern culture has an impact on attitudes toward homophobia, as it does not support LGBT individuals (Dinkel & Patzel, 2007). Social factors such as sexual orientation, gender, and socio-economic status (Elk, 2021), as well as cultural factors influenced by participants' various ethnicities (Elk, 2021) across Indonesia, could also play a role.

In the study, it was found that female students had more negative views compared to male participants, which contradicts previous studies suggesting that males tend to be more tolerant of homosexuality in the context of AIDS. One of the reasons for this negative view is that being gay is perceived as deviant behavior and is seen as not in line with the religious and cultural norms in Indonesia (Moore, 2017). When discussing homosexuality, some participants with conservative views may feel uncomfortable. When it's associated with AIDS, there's concern about the possibility of contracting AIDS-related diseases, often caused by direct contact with individuals who are gay. This viewpoint was also observed in nurses, with female nurses feeling more uncomfortable serving individuals with gay and lesbian identities (11.4% higher compared to male nurses at 6.1%). (S. Neville & Henrickson, 2006). The same attitude is also shown by residential care, which although most men still show an attitude of avoiding accepting people related to sexual behaviors such as lesbians and gays (S. . Neville et al., 2015) Similar attitudes were observed in residential care, as most men tended to avoid accepting people associated with sexual behaviors such as lesbians and gays, out of fear as they consider homosexuality to be illegal and a form of mental illness. This is contrary to previous research which showed men having a more negative attitude towards homosexuality in general due to traditional gender role views that oppose homosexuality and view it as deviant behavior (Monto & Supinski, 2015). In addition, students from state universities tended to be more supportive of homosexuals compared to those in private universities, but they held negative views about homosexuality when it was associated with AIDS. To address these differences in the future, it is necessary to retest with a larger and more diverse group of participants to minimize cultural differences and enhance cross-cultural validity.

The psychometric analysis of the current study indicates that the homophobic scale is acceptable (Cronbach's alpha = 0.79). However, this reliability is lower than that reported in previous studies (Ciocca et al., 2015; Moral-de la Rubia et al., 2015). It's important to note that there are differences in the traits of the homophobic scale assessed in this study compared to the scale in previous studies. For instance, (Moral de la Rubia & Valle de la O, 2014) selected only 8 out of 12 items on the homophobia scale and modified the alternatives into seven responses, while Ciocca et all (2015) had 25 items with three factors associated with homophobia, namely behavior/negative affect, affect/behavioral aggression and negative cognition. This difference explains the variance in reliability scores between these scales and the difference in the context of the study participants. The variation in responses by participants, particularly in questions such as Q2 and Q10, significantly impacts the reliability scores in this study. The different responses of the participants from Indonesia may be influenced by discriminatory factors carried out by religious institutions and educational institutions (Richardot & Bureau, 2020), especially given that the participants in Indonesia

Commented [NP5]: 4. Interpretation of Results
-Observation: The interpretation of the results, especially regarding gender differences and the association with AIDS, is superficial.
-Recommendation: Provide a richer and more contextualized interpretation of the findings, including a summary of the key results at the end of the results section

come from faith-based universities. Nevertheless, despite the variability in per-person reliability results, the item's reliability has shown satisfactory results, demonstrating an excellent level of reliability ($\alpha > 0.90$), slightly lower than the study conducted by Ciocca (2015) (Cronbach's α coefficient of 0.92). Thus, the excellent reliability of this item suggests that the homophobic scale has excellent internal consistency (You et al., 2020).

Although there is a scale of homophobia in place, it does not indicate acceptance or support for homosexual behavior in Indonesia. This scale is used to measure public responses to increasingly visible homosexual behavior. In the field of education, homosexual behavior in the LGBT community is viewed as contrary to the goals of Indonesia's national education, which aims to nurture individuals with faith, piety, noble character, health, knowledge, skills, creativity, and independence. Homosexuality is considered deviant and immoral within Indonesian religious and cultural contexts. Additionally, promiscuous sexual behavior among LGBT individuals poses a risk of HIV/AIDS transmission, contradicting Indonesia's national education goals and religious university education. Measurements of homophobia can influence government decisions regarding the establishment of legal protections for individuals, families, and society with respect to LGBT behavior through legislation (Wieringa, 2019). It is stated in Indonesia Constitution Article 27, paragraph (1) that "every citizen has an equal position before the law and the government." Furthermore, Article 28D (1) states that "each and every person has the right to recognition, security, protection, and certainty based on fair and equal treatment before the law," and Article 28E(3) reads that 'everyone has the right to freely associate, assemble, and express their opinion.'. Universities, whether religious-based or non-religious, should be able to create a comfortable public space for everyone to interact, engage in activities, and develop talents and achievements without exception. The results of the homophobia measurement also form the basis for decision-making regarding policies to protect the rights of heterosexual students from LGBT behavior and lifestyle by applying religious values, in order to create a conducive academic environment and religious climate that shapes students into a straight man.

Many non-religious universities explicitly forbid the presence of LGBT individuals on campus. It is imperative that all universities take steps to combat homophobia in order to prevent it from escalating into prejudice and violence (Wieringa, 2019). The results of this research will empower religious universities to establish regulations prohibiting the spread of hate or hate speech related to homosexuality. The academic community of religious universities must adhere to educational values aimed at fostering understanding, self-awareness, tolerance, moderation, compassion, and progressiveness. Measures to prevent acts of homophobia should be enhanced within the environment of faith-based universities, providing opportunities for creative expression and supporting students in their coursework to enable positive interactions among homosexual individuals. Additionally, steps can be taken to prohibit dress that does not align with gender norms, as this may cause discomfort for students.

Since the Yogyakarta Principles were released in 2007 as global guidelines for efforts to eliminate stigma and discrimination for LGBT groups (Principle On the Application of International Human Rights Law in Relation to Sexual Orientation and Gender Identity), the Indonesian Government has not taken concrete efforts to implement the principles Yogyakarta Principle. The existence of LGBT organizations in Indonesia invites polemics and is still a controversy of pros and cons in society. In student groups, they are divided into three categories, namely: the first group is pro-LGBT supporters. This group accepts the existence of LGBT people. The second group is a neutral team that responds to LGBT without any reaction in the gray area and tends not to care about the existence of LGBT. Third, counter or anti-LGBT groups who strongly oppose activities related to LGBT. The last group is the

Commented [NP6]: 5. Depth in Discussion
-Observation: The discussion could delve deeper into the implications of the findings and how they can influence future policies and educational practices.
-Recommendation: Expand on the practical implications and future research directions, providing specific examples of how the findings can improve policies and practices in religious universities

Commented [NP7]: 6. Practical Recommendations
-Observation: There is a lack of specific recommendations on how to use the study's results.
-Recommendation: Include concrete suggestions for educators and policymakers on how the study's findings can be implemented to address homophobia in religious universities

largest in Indonesia, due to the fact that same-sex marriage in Indonesia is not legalized by the Indonesian Government.

Conclusions and recommendation for further research

The level of homophobia in Indonesia is closely linked to the acceptance of the LGBT community. The background of the participants, whether they are students from state religion-based universities or private religion-based universities, has an influence on the results of the measurement of this homophobia scale. The religious and cultural teachings that prevail in Indonesia play an important role in shaping these attitudes. Some students still perceive homosexuality as deviant behavior, but they display positive behavior to support the rights of homosexuals to interact and participate in social life. However, the assessment of the homophobia scale has some limitations. It's important to expand the type and scope of assessment to allow for wider generalization. Research on this topic has only just begun in Indonesia, so the data reported here should be considered as a starting point.

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Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Novi Andayani Praptiningsih, Herri Mulyono, Benni Setiawan, Silvie Mil, Syaiful Rohim

Abstract

This study aims to evaluate the psychometric properties of the homophobia scale in students attending religion-based universities in Indonesia. This research is important as homosexuality is a controversial issue in the country and is still a topic of debate. The Homophobia Scale is a tool that assesses attitudes towards homosexuality through 17 items measuring positive affirmation, negative cognition, and the perceived threat of homosexual behavior. The scale was adapted for the Indonesian context, which is predominantly religious, based on The Heterosexual Attitudes Towards Homosexuality (HATH) Scale and Items, originally translated by bilingual experts. The translated scale was then reviewed for content by psychologists and communication experts, and field-tested for reliability and validity. Data from 327 students aged 18-35 from both state and private religion-based universities were analyzed using Rasch model analyses, including principal component analysis (PCA), reliability analysis, and differential item functioning (DIF) assessment. The study found that the homophobia scale accounted for 42.4% of the raw variance, indicating its unidimensionality. The scale demonstrated an acceptable level of personal reliability and excellent reliability for individual items. Results revealed significant demographic effects, with age and study program showing more differential item functioning (DIF). Male students were more tolerant towards homosexuals than females. Additionally, students at state universities tended to be more tolerant, but held negative views of homosexuality when associated with AIDS. In conclusion, the homophobia scale assessed in this study exhibits promising construct validity and sufficient psychometric properties. The findings indicate that negative stigma towards homosexuals and homophobia still persist among students at religion-based universities in Indonesia, despite limited interaction with homosexuals

Keywords: homophobia; religion-based universities; Rasch analysis, psychometric assessment, psychometric properties

Introduction

The stigmatization of homosexuals among university students has been well documented in the literature. For instance, a study by Kite and Bryant-Less (2016) has shown that many homosexual students received discrimination acts from peers with different sexual orientations. Likewise, Winberg et al. (2019) demonstrated that the stigmatization of homosexuals resulted in North American students using phrases such as "That's so gay!" and "No homo!" as negative expressions, implying that being homosexual is inferior to being heterosexual. In Mexico, the rejection percentage towards homosexuals among undergraduate students had reached 18% with 3% extreme rejection (Moral de la Rubia & Valle de la O, 2014). In African universities, many homosexual students were reported to experience stigmatization by usually being labeled as sinners, satanic, or 'demon-possessed' (Mavhandu-Mudzusi, 2017). Mavandu-Mudzusi (2017) also described that stigmatization and discrimination happened almost everywhere on campus, including in lecture halls at the university or other areas such as student residential areas and sports grounds.

The term "homophobia" was first coined by George Weinberg in 1967 to describe the negative stigmatization, discrimination, or rejection towards people with a homosexual orientation (Morris, 2019). It is characterized by irrational condemnation of homosexuals,

including acts of violence, deprivation, and separation and Weinberg viewed homophobia as a form of mental illness. Homophobia refers to the negative emotions, attitudes, and behaviors directed towards individuals with different sexual orientations, such as lesbian, gay, bisexual, and transgender individuals, (Beydağ & Alp Dal, 2022) and Kimmel (2017) specifically links homophobia to behavior and sexual acts related to homosexual men. Another definition states that homophobia is a tendency to discriminate against homosexuals through psychological and social aversion, in some cases manifested in the form of acts of violence against them (Ciocca et al., 2015)

The intensity and level of homophobia in society depends on public awareness regarding the significance of the number of homosexuals in society which is becoming more prominent from time to time (Morris, 2019). Research conducted by Alfred Kinsey and colleagues in the late 1940s and early 1950s further increased awareness that 13% of men and 7% of women had homosexual tendencies (Spiegelhalter, 2015). Many people reject homosexuals based on their personal beliefs, saying that homosexuality is unacceptable in their society (Barragán-Medero & Pérez-Jorge, 2020). This leads to isolation, verbal harassment, insults, slurs, threats of harm, and even physical abuse, particularly among university students (Allen, 2019; Mathies et al., 2019). This behavior reflects homophobia, which involves harmful actions as a way to justify disliking people with different sexual preferences. Research shows that those who believe sexual orientation is a "choice" tend to be less tolerant of homosexuality compared to those who believe it is beyond an individual's control. Similarly, individuals who have interacted with lesbian or gay individuals tend to have more positive attitudes towards homosexuals than those who have not had such interactions (Kimmel, 2017)

In his study, Fyfe (1983) demonstrates that homophobia can manifest at three different levels: 1) cultural homophobia, which seeks to uphold traditional gender roles in conservative perspectives; 2) homophobic attitudes, which encompass a series of consistently negative attitudes toward homosexuals; 3) homophobia as a personality trait correlated with rigidity, authoritarianism, conservatism, and an intolerance of ambiguity and deviation. The preservation of conservative gender norms in culture is influenced by cultural norms upheld by religion (Wilets, 2016). However, religion is not always the primary influence shaping homophobic behavior (Schulte & Battle, 2004) and in some cases, does not contribute to homophobic attitudes at all (Wilets, 2016). While it is true that religion often strengthens or endorses positive attitudes toward homosexual qualities, it's essential to note that "religion" and "homophobia" are not synonymous. Negative attitudes towards homophobia are evident in the form of derogatory remarks and acts of violence stemming from animosity towards gays and lesbians (Odenbring & Johansson, 2021).

The level and intensity of homophobia in society depends on public awareness of the existence of homosexuals in a population, and this awareness has greatly increased during the twentieth century (Morris, 2019). Several studies have been conducted to measure attitudes towards homosexuals towards gays and lesbians. A cross-sectional study of medical students from 12 universities in Peru stated that male chauvinist students were more homophobic than female students. This discrepancy is influenced by several factors, including the fact that women are generally more tolerant, study in the capital, adhere to the Catholic religion and have prior knowledge of and interaction with homosexuals (Nieto-Gutierrez et al., 2019). 2019).

Homophobia can be measured using several methods (Fraïssé & Barrientos, 2016). In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes toward a diverse set of topics. However, other research found that Smith did not clearly describe the H-scale he developed and did not provide a threshold for categorization. In 1984, Herek developed the concept of “sexual prejudice”

which describes negative attitudes towards homosexuality. In this sexual prejudice, the attitudes and behaviors that emerge are hostile to homosexuals. Herek developed an instrument to evaluate two aspects of rejection toward gay men and rejection toward lesbians. Herek's instrument, the 'Attitudes Towards Lesbians and Gay Men (ATLG),' evaluates rejection towards gay men and lesbians through 20 items. This scale assesses attitudes and comfort levels when interacting with homosexual individuals in various social situations (Moral de la Rubia & Valle de la O, 2014). The ATLG is widely used and validated in various contexts in different countries (Herek & McLemore, 2013) However, it does not seem to provide a good fit for data from Latin American countries.

There are some homophobia scales that have been developed. The first one is by Ricketts & Hudson, called the Attitude Index towards Student Homophobia behavior (HBBS) (Siebert et al., 2009). It consists of 25 items and measures homophobia attitudes. Some items use negative wording to offset potential response bias. Scores on this scale range from 0 to 100, with scores above 50 indicating increasingly homophobic attitudes. The scale reportedly has a Cronbach's Alpha of 0.90. The second scale, developed by Van de Ven, Bornhodt, and Bailey in 1996, measures students' responses to gay and lesbian behavior in social and classroom settings (Dinkel & Patzel, 2007). This scale uses a Likert type with ten items, allowing the ranking of intents on five levels from definitely false to absolutely true. The score range for this scale is also 0-100, with a higher score indicating a more negative intention to behave towards homosexuals. The reliability of this scale is reported with a Cronbach's alpha of 0.81. However, this study has limitations, including the inability to compare the results with previous investigations due to the relatively small sample size, which limits statistical analysis, and the lack of similar research among nursing students. Nonetheless, overall, this scale is considered acceptable and usable.

A scale to measure homophobia was developed by conducting factor analysis on responses to statements regarding attitudes towards lesbians and gays. The analysis involved 72 US Marine Corps Reserve members (Estrada, 2002). The results revealed four contributing factors - trust, comfort, acceptance, and threat. There are 14 items in the scale that measure attitudes towards homosexuals in the military, and a Likert scale ranging from strongly agree (1) to strongly disagree (4) is used. Individual scores range from 14 (indicating a very negative attitude) to 56 (indicating a very positive attitude), and the scale's Cronbach's alpha ranges from 0.63 to 0.78. However, the scale has limitations due to its small sample size, exclusive focus on male participants, and concentration on young marines in the Reserve Corps. This necessitates further research for broader applicability. Another study involved adapting and testing the HBBS (Herek's Homophobia Behavior Scale) for reliability and validity in Chile (Cárdenas & Barrientos, 2008). 152 volunteers from introductory undergraduate programs in psychology and economics participated in this study. The scale includes social and demographic measures such as socioeconomic level, religion, sexual orientation, political categorization, and ethnic minorities, as well as variables related to power and intimacy. The results of the measurement indicate the scale's validity and realism, with a Cronbach's alpha of 0.90. However, it is acknowledged that participants may not always feel comfortable expressing their attitudes in public, which could lead to improved impressions. To address this, further research is recommended to develop indirect (non-reactive) measurements that provide insight into people's internal states and attitudes.

The purpose of this study was to evaluate the psychometric properties of the homophobia scale using data from religion-based universities. This is an important study because Indonesia is a country where various religions discourage LGBT practices and consider them to be inconsistent with cultural norms. Despite this, there has been a notable increase in the number of individuals openly identifying as gay in Indonesia (Praptiningsih et al., 2020). This trend is concerning, making it important to investigate attitudes toward gay

behavior by measuring levels of homophobia using a scale that is appropriate for Indonesian culture. By assessing the extent of homophobia, the government and other stakeholders can understand attitudes and create policies to ensure that individuals who identify as gay are not subjected to verbal or physical abuse (Boellstorff, 2004). This aims to guarantee that their rights as citizens are respected while also preventing the promotion of a lifestyle that contradicts prevailing cultural and religious norms in Indonesia. The Rasch model analysis method was used to objectively assess the validity and reliability of the scale. The Rasch measurement model is utilized because it enables researchers to place individuals' abilities on the same scale irrespective of the specific survey they complete (M. S. Khine, 2020). With this model, researchers can also evaluate the difficulty of survey items and the respondents' ability to answer those items (Ben, 2020) The results of the Rasch analysis are presented in a Wright Map. On the left side of the map, the position of an item indicates its difficulty level, with lower positions representing easier items and higher positions representing more difficult items. On the right side, individuals with lower response ability are located at the bottom, while those with higher response ability are positioned at the top of the map (Boone et al., 2014, 2016). Rasch modeling allows for the conversion of different item and attribute values into the same scale, known as the logit scale, thereby enabling the listing of items and attributes at the same scale (Yu, 2020) Furthermore, Rasch assessment of ordinal survey data as frequency provides an interpretation of opportunity. This establishes Rasch as a method for ensuring reliable and objective measurements, evaluating the relationship between question difficulty and respondent ability on the same interval (Rusland et al., 2020).

Method

Sample

The data for the analysis in the current study were collected from two cohorts of students in Indonesia: those from state religion-based universities and those from private religion-based universities. A total of 327 students participated using non-probability sampling methods, with 98 students from state religion-based universities and 229 students from private religion-based universities. The majority of the students identified as Muslim (N=322), while a small number identified as Protestant (N=4) or Buddhist (N=1).

It is crucial to ensure sample homogeneity in this research, particularly due to the necessity of studying specific sociodemographic characteristics of participants from religion-based universities. By selecting a homogeneous sample, we can avoid outliers and bias in the data. Another benefit of using a homogeneous sample offer narrower but clearer generalizability (Jager et al., 2017). A more homogeneous population is more likely to provide a representative sample. The homogeneity of the sample also influences the generalizability of results to other populations with similar sociodemographic characteristics, as opposed to heterogeneous samples. The data in this research group shows no differences in either the average value or variance compared to other groups in the data set. The participants in this research are students currently enrolled at a religion-based university at any level of education - diploma, bachelor's, master's, or doctoral degrees. These students have provided verbal consent, which has been digitally registered prior to the survey.This characteristic limits the generalization of the results to the university context and other populations due to the relationship between the experiences of the research subjects and the variables in this study. Specifically, in the context of this study, it pertains to the religious background of the research subjects. The religious background could influence how the sample completes the homophobia questionnaire in this study. In addition to religion, homophobia is also impossible to analyze without referring to cultural norms related to gender and race (Wilets, 2016).

In the participant demographic table, participants' socio-demographics are explained based on gender, age, study program, and university of origin to clarify the participant's condition. A more detailed demography of the participants is described in the following Table 1.

Table 1 Demography of the participants

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21 – 25	112	34.3
	26 – 30	15	4.6
	31 – 35	2	0.6
	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Private university	229	70.03

Data collecting instrument and procedure

The research protocol for the data-collecting procedure was approved by the authors' university ethics committee. The data-collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999a), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. This instrument was chosen in this study because the items in this study are appropriate to the context of society in Indonesia where many participants still have conservative and fundamentalist views of religion and include elements of associated risk. with health (Klamen et al., 1999). The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age, and the study program that students took at the time of the survey to clarify the sociodemographic conditions of participants. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree (score = 5), agree (score = 4), neutral (score = 3), disagree (score = 2), and strongly disagree (score = 1). Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (Klamen et al., 1999b). After the ethics clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. The research was conducted with voluntary student participation. Informed consent was obtained, ensuring participant confidentiality and explaining potential research risks. Participant confidentiality is closely related to anonymity (Wiles et al., 2008). In the context of this study, confidentiality means that the researcher does not discuss the information provided by the respondent with others (Wiles et al., 2008) and presents the findings by ensuring that the individual is not identified. (Ong & Weiss, 2000) explicitly. These principles were outlined in the informed consent, which participants agreed to in writing. Data collection was carried out through an online survey using Google Forms so that it was effective considering that participants came from all regions of Indonesia and also made it easy

to fill in so it didn't take too long. The survey was designed to be user-friendly and efficient, providing participants with information about the research purpose and their rights

Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principal Component Analysis (PCA), the analysis of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1 application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (Ben, 2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items. Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020). In Rasch everything can be predicted so that we can assess the psychometric properties of the homophobia scale more objectively.

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit the Rasch analysis because their logit values were observed beyond the threshold -2 and +2 (Huang et al., 2020). Linacre (Linacre, 2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

Result

Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2 Students responses to Homophobia scale items

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	-0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	-1.10	0.08

Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	-0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	-0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	-0.42	0.07
Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	-0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	-1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE=standard of error

Table 3 Descriptive statistics for person and item

	Person statistics (N=213)		Item statistics (N=17)	
	Total score	Logit	Total score	Logit
Min	25.0	-2.20	401.0	-1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	-0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at -0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Figure 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

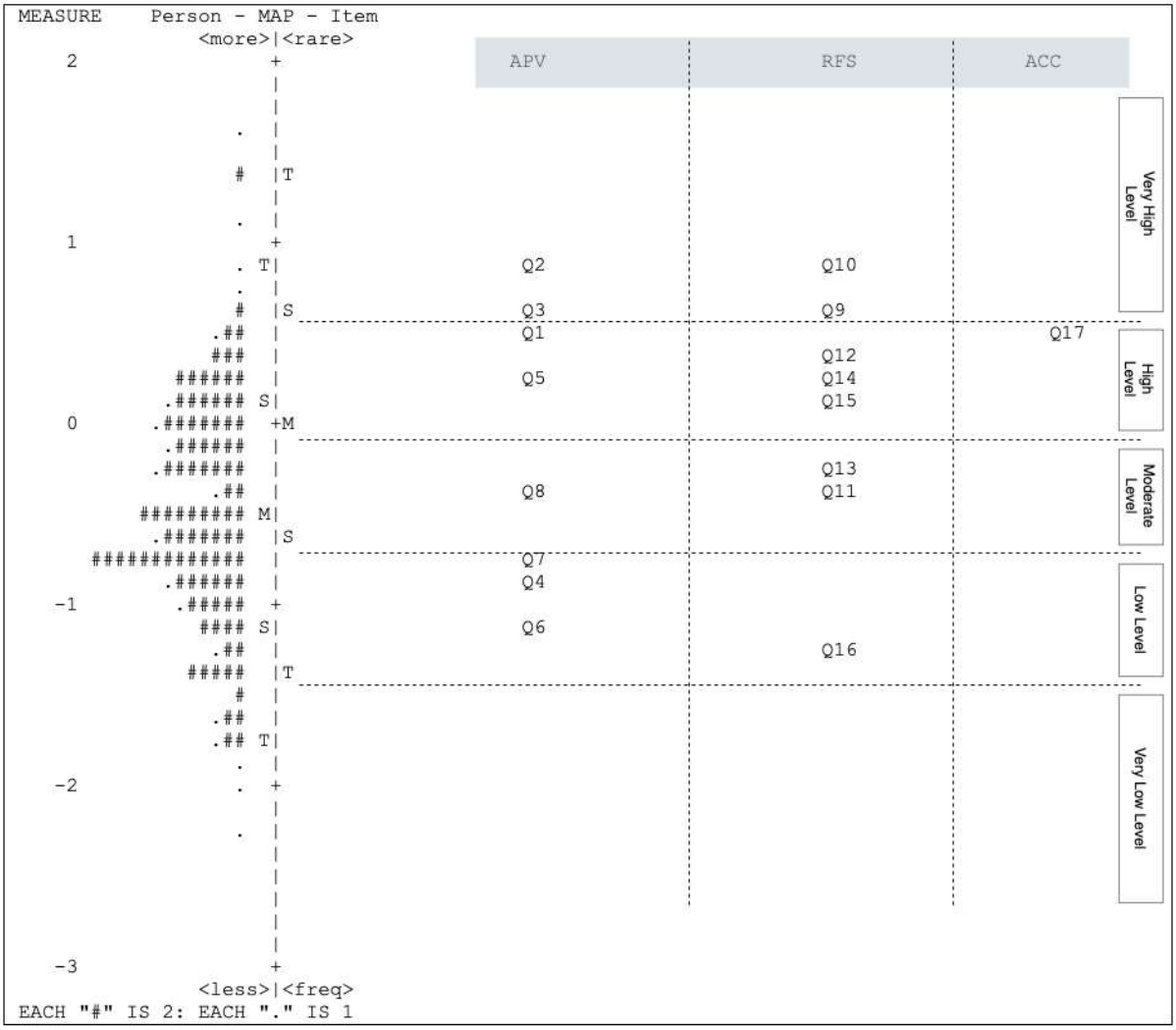

Fig 1. Wright person-item map (N= 213).

"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\,G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1-8, Refusal (RFS): Q9-16, Acceptance (ACC): Q17)

Evaluation of Rasch PCA

Rasch PCA analysis was carried out to test the assumption of unidimensionality of the homophobia scale which states that (1) the easier the question, the more likely participants are to respond to the homophobia scale correctly, and (2) the greater the ability of participants, the greater the possibility they answered questions on the homophobia scale correctly. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20% (the global scale=42.4%, the Approval subscale=55.0% and Refusal subscale=48.2%). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits

continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level ($\alpha > 0.90$), and the reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

Differential Item Functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Table 5 and Table 6 exemplifies the DIF on gender and university demography, respectively.

Table 4 Potential DIF on the scale item

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21 – 25 (2) 26 – 30 (3) 31 – 35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,
4	University	State university (1) Private university (2)	2	Q8, Q16

Table 5 DIF on scale item for gender

Item	Gender	DIF measure	DIF contrast	*t*	*p*
Q10	1	1.31	0.56	2.83	0.00
	2	0.74			
Q11	1	-0.01	0.57	3.50	0.00
	2	-0.59			

Table 6 DIF on scale item for gender

Item	University	DIF measure	DIF contrast	*t*	*Probability*
Q8	4	-0.23	0.60	3.72	0.00
	2	-0.83			
Q16	4	-1.05	0.66	3.78	0.00
	2	-1.71			

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be

more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast > 0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15%, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items (N=10) were considered difficult to respond (Logit value > 0.00), and few items were regarded as easy (N=4). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society. This could be influenced, among other things, by perceptions of discrimination by educational institutions (Richardot & Bureau, 2020) but on the other hand, the participants, all of whom have religious backgrounds and tend to be religious fundamentalists, still hold that homosexuality is unnatural and not accepted in Indonesia. In their view, homosexual behavior is considered a toxic relationship that can poison the behavior of those around them to follow their lifestyle as a gay person (Praptiningsih et al., 2020, 2024). This contrasts with the results of a study in Chile, where traditional values, social sanctions, and social rights are the three factors that contribute to the structural factors in the measurement of The Attitudes Toward Lesbians and Gay Men Scale (ATLG) (Cárdenas & Barrientos, 2008)

The religious background of the sample group strongly influenced their view on homosexuality and homophobia. For example, out of 329 participants, 322 had a Muslim background, which correlated with their attitudes. This relationship between religiosity and homophobia was also observed among undergraduate students, as reported by Wilkinson (2004). In Indonesia, Islam and Christianity strictly prohibit homosexuality, while Hinduism, Buddhism, and Confucianism lenient stance. This has a significant effect on homophobia, as supported by Balkin et al (2009) who found that religious beliefs are a significant predictor of prejudice in homophobia. Although there is a relationship between religion and homophobia, religion itself is not always the main agent that constitutes homophobia behavior and sometimes does not contribute to homophobia at all (Wilets, 2016). A study in Ghana has shown that the media stimulates and perpetuates homophobia and heterosexism. The media is also used as a platform for politicians to gather support for reactionary interventions against homosexuality (Tettey, 2016). Additionally, the teachings of the religions in Indonesia, such as Islam, Christianity, Hinduism, Buddhism, and Confucianism, also promote tolerance towards fellow human beings. This implies that individuals with a sexual orientation disorder, such as homosexuals, still have the right to live their lives well, and religious adherents should

respect them by giving them the same opportunities as other people to engage in activities related to the economy, health, and education, irrespective of their sexual orientation.

It's crucial to note that several scale items showed potential differential item functioning (DIF) based on participants' demographic characteristics. Specifically, potential DIF was identified in many items related to participants' age (NDIF = 14) and their study program (NDIF = 9). These findings suggest the need to revise the classification of age and study programs. The wide age range is attributed to participants coming from different levels of education—Diploma program, Bachelor's Program, Master's Program, and Doctoral Program—each with its own age range. Other research in nursing students at Midwestern University indicates that Midwestern culture has an impact on attitudes toward homophobia, as it does not support LGBT individuals (Dinkel & Patzel, 2007). Social factors such as sexual orientation, gender, and socio-economic status (Elk, 2021), as well as cultural factors influenced by participants' various ethnicities (Elk, 2021) across Indonesia, could also play a role.

In the study, it was found that female students had more negative views compared to male participants, which contradicts previous studies suggesting that males tend to be more tolerant of homosexuality in the context of AIDS. One of the reasons for this negative view is that being gay is perceived as deviant behavior and is seen as not in line with the religious and cultural norms in Indonesia (Moore, 2017). When discussing homosexuality, some participants with conservative views may feel uncomfortable. When it's associated with AIDS, there's concern about the possibility of contracting AIDS-related diseases, often caused by direct contact with individuals who are gay. This viewpoint was also observed in nurses, with female nurses feeling more uncomfortable serving individuals with gay and lesbian identities (11.4% higher compared to male nurses at 6.1%). (S. Neville & Henrickson, 2006). The same attitude is also shown by residential care, which although most men still show an attitude of avoiding accepting people related to sexual behaviors such as lesbians and gays (S. . Neville et al., 2015) Similar attitudes were observed in residential care, as most men tended to avoid accepting people associated with sexual behaviors such as lesbians and gays, out of fear as they consider homosexuality to be illegal and a form of mental illness. This is contrary to previous research which showed men having a more negative attitude towards homosexuality in general due to traditional gender role views that oppose homosexuality and view it as deviant behavior (Monto & Supinski, 2015). In addition, students from state universities tended to be more supportive of homosexuals compared to those in private universities, but they held negative views about homosexuality when it was associated with AIDS. To address these differences in the future, it is necessary to retest with a larger and more diverse group of participants to minimize cultural differences and enhance cross-cultural validity.

The psychometric analysis of the current study indicates that the homophobic scale is acceptable (Cronbach's alpha = 0.79). However, this reliability is lower than that reported in previous studies (Ciocca et al., 2015; Moral-de la Rubia et al., 2015). It's important to note that there are differences in the traits of the homophobic scale assessed in this study compared to the scale in previous studies. For instance, (Moral de la Rubia & Valle de la O, 2014) selected only 8 out of 12 items on the homophobia scale and modified the alternatives into seven responses, while Ciocca et all (2015) had 25 items with three factors associated with homophobia, namely behavior/negative affect, affect/behavioral aggression and negative cognition. This difference explains the variance in reliability scores between these scales and the difference in the context of the study participants. The variation in responses by participants, particularly in questions such as Q2 and Q10, significantly impacts the reliability scores in this study. The different responses of the participants from Indonesia may be influenced by discriminatory factors carried out by religious institutions and educational institutions (Richardot & Bureau, 2020), especially given that the participants in Indonesia

come from faith-based universities. Nevertheless, despite the variability in per-person reliability results, the item's reliability has shown satisfactory results, demonstrating an excellent level of reliability ($\alpha > 0.90$), slightly lower than the study conducted by Ciocca (2015) (Cronbach's α coefficient of 0.92). Thus, the excellent reliability of this item suggests that the homophobic scale has excellent internal consistency (You et al., 2020).

Although there is a scale of homophobia in place, it does not indicate acceptance or support for homosexual behavior in Indonesia. This scale is used to measure public responses to increasingly visible homosexual behavior. Homosexuality is considered a personality disorder within Indonesian religious and cultural contexts. Measurements of homophobia can influence government decisions regarding the establishment of legal protections for individuals, families, and society with respect to LGBT behavior through legislation (Wieringa, 2019). It is stated in Indonesia Constitution Article 27, paragraph (1) that "every citizen has an equal position before the law and the government." Furthermore, Article 28D (1) states that "each and every person has the right to recognition, security, protection, and certainty based on fair and equal treatment before the law," and Article 28E(3) reads that 'everyone has the right to freely associate, assemble, and express their opinion.'. Universities, whether religious-based or non-religious, should be able to create a comfortable public space for everyone to interact, engage in activities, and develop talents and achievements without exception.

Many non-religious universities explicitly forbid the presence of LGBT individuals on campus. It is imperative that all universities take steps to combat homophobia in order to prevent it from escalating into prejudice and violence (Wieringa, 2019). The results of this research will empower religious universities to establish regulations prohibiting the spread of hate or hate speech related to homosexuality. The academic community of religious universities must adhere to educational values aimed at fostering understanding, self-awareness, tolerance, moderation, compassion, and progressiveness. Measures to prevent acts of homophobia should be enhanced within the environment of faith-based universities, providing opportunities for creative expression and supporting students in their coursework to enable positive interactions among homosexual individuals.

Since the Yogyakarta Principles were released in 2007 as global guidelines for efforts to eliminate stigma and discrimination for LGBT groups (Principle On the Application of International Human Rights Law in Relation to Sexual Orientation and Gender Identity), the Indonesian Government has not taken concrete efforts to implement the principles Yogyakarta Principle. The existence of LGBT organizations in Indonesia invites polemics and is still a controversy of pros and cons in society. In student groups, they are divided into three categories, namely: the first group is pro-LGBT supporters. This group accepts the existence of LGBT people. The second group is a neutral team that responds to LGBT without any reaction in the gray area and tends not to care about the existence of LGBT. Third, counter or anti-LGBT groups who strongly oppose activities related to LGBT. The last group is the largest in Indonesia, due to the fact that same-sex marriage in Indonesia is not legalized by the Indonesian Government.

Conclusions and recommendation for further research

The level of homophobia in Indonesia is closely linked to the acceptance of the LGBT community. The background of the participants, whether they are students from state religion-based universities or private religion-based universities, has an influence on the results of the measurement of this homophobia scale. The religious and cultural teachings that prevail in Indonesia play an important role in shaping these attitudes. Some students still perceive homosexuality as deviant behavior, but they display positive behavior to support the rights of homosexuals to interact and participate in social life. However, the assessment of the homophobia scale has some limitations. It's important to expand the type and scope of

assessment to allow for wider generalization. Research on this topic has only just begun in Indonesia, so the data reported here should be considered as a starting point.

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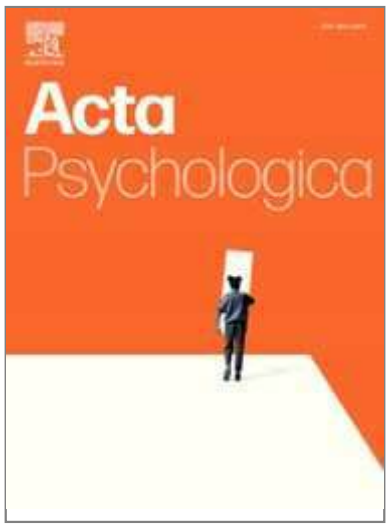

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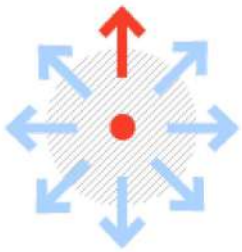

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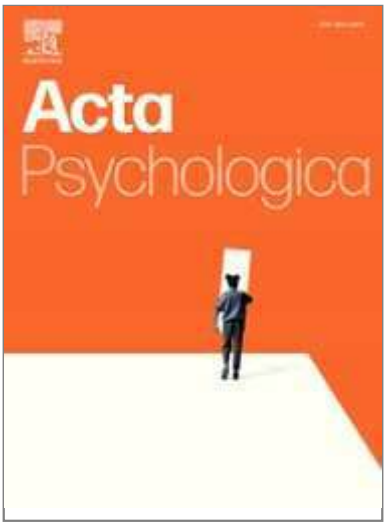

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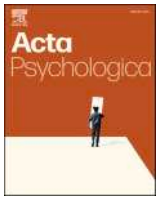

Evaluation of the psychometric properties of the homophobia scale in religious-based university students in Indonesia

Novi Andayani Praptiningsih [a,*], Herri Mulyono [a], Silvie Mil [a], Syaiful Rohim [a], Benni Setiawan [b]

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Rasch analysis
Psychometric assessment
Psychometric properties

ABSTRACT

This study aims to evaluate the psychometric properties of the homophobia scale in students attending religion-based universities in Indonesia. This research is important as homosexuality is a controversial issue in the country and is still a topic of debate. The Homophobia Scale is a tool that assesses attitudes towards homosexuality through 17 items measuring positive affirmation, negative cognition, and the perceived threat of homosexual behavior. The scale was adapted for the Indonesian context, which is predominantly religious, based on The Heterosexual Attitudes Towards Homosexuality (HATH) Scale and Items, originally translated by bilingual experts. The translated scale was then reviewed for content by psychologists and communication experts, and field-tested for reliability and validity. Data from 327 students aged 18–35 from both state and private religion-based universities were analyzed using Rasch model analyses, including principal component analysis (PCA), reliability analysis, and differential item functioning (DIF) assessment. The study found that the homophobia scale accounted for 42.4 % of the raw variance, indicating its unidimensionality. The scale demonstrated an acceptable level of personal reliability and excellent reliability for individual items. Results revealed significant demographic effects, with age and study program showing more differential item functioning (DIF). Male students were more tolerant towards homosexuals than females. Additionally, students at state universities tended to be more tolerant but held negative views of homosexuality when associated with AIDS. In conclusion, the homophobia scale assessed in this study exhibits promising construct validity and sufficient psychometric properties. The findings indicate that negative stigma towards homosexuals and homophobia still persist among students at religion-based universities in Indonesia, despite limited interaction with homosexuals.

1. Introduction

The stigmatization of homosexuals among university students has been well documented in the literature. For instance, a study by Kite and Bryant-Lees (2016) has shown that many homosexual students received discrimination acts from peers with different sexual orientations. Likewise, Winberg et al. (2019) demonstrated that the stigmatization of homosexuals resulted in North American students using phrases such as "That's so gay!" and "No homo!" as negative expressions, implying that being homosexual is inferior to being heterosexual. In Mexico, the rejection percentage towards homosexuals among undergraduate students had reached 18 % with 3 % extreme rejection (Moral de la Rubia & Valle de la, 2014). In African universities, many homosexual students were reported to experience stigmatization by usually being labeled as sinners, satanic, or 'demon-possessed' (Mavhandu-Mudzusi, 2017). Mavhandu-Mudzusi (2017) also described that stigmatization and discrimination happened almost everywhere on campus, including in lecture halls at the university or other areas such as student residential areas and sports grounds.

The term "homophobia" was first coined by George Weinberg in 1967 to describe the negative stigmatization, discrimination, or rejection towards people with a homosexual orientation (Morris, 2019). It is characterized by irrational condemnation of homosexuals, including acts of violence, deprivation, and separation and Weinberg viewed homophobia as a form of mental illness. Homophobia refers to the negative emotions, attitudes, and behaviors directed towards individuals with different sexual orientations, such as lesbian, gay, bisexual, and transgender individuals, (Beydağ & Alp Dal, 2022) and Kimmel (2017)

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specifically links homophobia to behavior and sexual acts related to homosexual men. Another definition states that homophobia is a tendency to discriminate against homosexuals through psychological and social aversion, in some cases manifested in the form of acts of violence against them (Ciocca et al., 2015).

The intensity and level of homophobia in society depends on public awareness regarding the significance of the number of homosexuals in society, which is becoming more prominent from time to time (Morris, 2019). Research conducted by Alfred Kinsey and colleagues in the late 1940s and early 1950s further increased awareness that 13 % of men and 7 % of women had homosexual tendencies (Spiegelhalter, 2015). Many people reject homosexuals based on their personal beliefs, saying that homosexuality is unacceptable in their society (Barragán-Medero & Pérez-Jorge, 2020). This leads to isolation, verbal harassment, insults, slurs, threats of harm, and even physical abuse, particularly among university students (Allen, 2019; Mathies et al., 2019). This behavior reflects homophobia, which involves harmful actions as a way to justify disliking people with different sexual preferences. Research shows that those who believe sexual orientation is a "choice" tend to be less tolerant of homosexuality compared to those who believe it is beyond an individual's control. Similarly, individuals who have interacted with lesbian or gay individuals tend to have more positive attitudes towards homosexuals than those who have not had such interactions (Kimmel, 2017).

In his study, Fyfe (1983) demonstrates that homophobia can manifest at three different levels: 1) cultural homophobia, which seeks to uphold traditional gender roles in conservative perspectives; 2) homophobic attitudes, which encompass a series of consistently negative attitudes towards homosexuals; 3) homophobia as a personality trait correlated with rigidity, authoritarianism, conservatism, and an intolerance of ambiguity and deviation. The preservation of conservative gender norms in culture is influenced by cultural norms upheld by religion (Wilets, 2016). However, religion is not always the primary influence shaping homophobic behavior (Schulte & Battle, 2004) and in some cases, does not contribute to homophobic attitudes at all (Wilets, 2016). While it is true that religion often strengthens or endorses positive attitudes towards homosexual qualities, it's essential to note that "religion" and "homophobia" are not synonymous. Negative attitudes towards homophobia are evident in the form of derogatory remarks and acts of violence stemming from animosity towards gays and lesbians (Odenbring & Johansson, 2021).

The level and intensity of homophobia in society depends on public awareness of the existence of homosexuals in a population, and this awareness has greatly increased during the twentieth century (Morris, 2019). Several studies have been conducted to measure attitudes towards homosexuals towards gays and lesbians. A cross-sectional study of medical students from 12 universities in Peru stated that male chauvinist students were more homophobic than female students. This discrepancy is influenced by several factors, including the fact that women are generally more tolerant, study in the capital, adhere to the Catholic religion and have prior knowledge of and interaction with homosexuals (Nieto-Gutierrez et al., 2019).

Homophobia can be measured using several methods (Fraïssé & Barrientos, 2016). In an earlier 1971 study, Smith developed a psychometrically measurement comprising 24 self-report questionnaire items with two classifications: 9 items of homophobia scale (H-scale) and 15 items evaluating the individual attitudes towards a diverse set of topics. However, other research found that Smith did not clearly describe the H-scale he developed and did not provide a threshold for categorization. In 1984, Herek developed the concept of "sexual prejudice" which describes negative attitudes towards homosexuality. In this sexual prejudice, the attitudes and behaviors that emerge are hostile to homosexuals. Herek developed an instrument to evaluate two aspects of rejection towards gay men and rejection towards lesbians. Herek's instrument, the 'Attitudes Towards Lesbians and Gay Men (ATLG),' evaluates rejection towards gay men and lesbians through 20 items. This scale assesses attitudes and comfort levels when interacting with homosexual individuals in various social situations (Moral de la Rubia & Valle de la, 2014). The ATLG is widely used and validated in various contexts in different countries (Herek & McLemore, 2013) However, it does not seem to provide a good fit for data from Latin American countries.

There are some homophobia scales that have been developed. The first one is by Ricketts & Hudson, called the Attitude Index towards Student Homophobia behavior (HBBS) (Siebert et al., 2009). It consists of 25 items and measures homophobia attitudes. Some items use negative wording to offset potential response bias. Scores on this scale range from 0 to 100, with scores above 50 indicating increasingly homophobic attitudes. The scale reportedly has a Cronbach's Alpha of 0.90. The second scale, developed by Van de Ven, Bornhodt, and Bailey in 1996, measures students' responses to gay and lesbian behavior in social and classroom settings (Dinkel & Patzel, 2007). This scale uses a Likert type with ten items, allowing the ranking of intents on five levels from definitely false to absolutely true. The score range for this scale is also 0–100, with a higher score indicating a more negative intention to behave towards homosexuals. The reliability of this scale is reported with a Cronbach's alpha of 0.81. However, this study has limitations, including the inability to compare the results with previous investigations due to the relatively small sample size, which limits statistical analysis, and the lack of similar research among nursing students. Nonetheless, overall, this scale is considered acceptable and usable.

A scale to measure homophobia was developed by conducting factor analysis on responses to statements regarding attitudes towards lesbians and gays. The analysis involved 72 US Marine Corps Reserve members (Estrada, 2002). The results revealed four contributing factors - trust, comfort, acceptance, and threat. There are 14 items in the scale that measure attitudes towards homosexuals in the military, and a Likert scale ranging from strongly agree (1) to strongly disagree (4) is used. Individual scores range from 14 (indicating a very negative attitude) to 56 (indicating a very positive attitude), and the scale's Cronbach's alpha ranges from 0.63 to 0.78. However, the scale has limitations due to its small sample size, exclusive focus on male participants, and concentration on young marines in the Reserve Corps. This necessitates further research for broader applicability. Another study involved adapting and testing the HBBS (Herek's Homophobia Behavior Scale) for reliability and validity in Chile (Cárdenas & Barrientos, 2008). 152 volunteers from introductory undergraduate programs in psychology and economics participated in this study. The scale includes social and demographic measures such as socioeconomic level, religion, sexual orientation, political categorization, and ethnic minorities, as well as variables related to power and intimacy. The results of the measurement indicate the scale's validity and realism, with a Cronbach's alpha of 0.90. However, it is acknowledged that participants may not always feel comfortable expressing their attitudes in public, which could lead to improved impressions. To address this, further research is recommended to develop indirect (non-reactive) measurements that provide insight into people's internal states and attitudes.

The purpose of this study was to evaluate the psychometric properties of the homophobia scale using data from religion-based universities. This is an important study because Indonesia is a country where various religions discourage LGBT practices and consider them to be inconsistent with cultural norms. Despite this, there has been a notable increase in the number of individuals openly identifying as gay in Indonesia (Praptiningsih et al., 2020). This trend is concerning, making it important to investigate attitudes towards gay behavior by measuring levels of homophobia using a scale that is appropriate for Indonesian culture. By assessing the extent of homophobia, the government and other stakeholders can understand attitudes and create policies to ensure that individuals who identify as gay are not subjected to verbal or physical abuse (Boellstorff, 2004). This aims to guarantee that their rights as citizens are respected while also preventing the promotion of a lifestyle that contradicts prevailing cultural and religious norms in Indonesia.

The Rasch model analysis method was used to objectively assess the validity and reliability of the scale. The Rasch measurement model is utilized because it enables researchers to place individuals' abilities on the same scale irrespective of the specific survey they complete (M. S. Khine, 2020). With this model, researchers can also evaluate the difficulty of survey items and the respondents' ability to answer those items (Ben, 2020) The results of the Rasch analysis are presented in a Wright Map. On the left side of the map, the position of an item indicates its difficulty level, with lower positions representing easier items and higher positions representing more difficult items. On the right side, individuals with lower response ability are located at the bottom, while those with higher response ability are positioned at the top of the map (Boone et al., 2014, 2016). Rasch modeling allows for the conversion of different item and attribute values into the same scale, known as the logit scale, thereby enabling the listing of items and attributes at the same scale (Yu, 2020) Furthermore, Rasch assessment of ordinal survey data as frequency provides an interpretation of opportunity. This establishes Rasch as a method for ensuring reliable and objective measurements, evaluating the relationship between question difficulty and respondent ability on the same interval (Rusland et al., 2020).

2. Method

2.1. Sample

The data for the analysis in the current study were collected from two cohorts of students in Indonesia: those from state religion-based universities and those from private religion-based universities. A total of 327 students participated using non-probability sampling methods, with 98 students from state religion-based universities and 229 students from private religion-based universities. The majority of the students identified as Muslim ($N = 322$), while a small number identified as Protestant ($N = 4$) or Buddhist ($N = 1$).

It is crucial to ensure sample homogeneity in this research, particularly due to the necessity of studying specific sociodemographic characteristics of participants from religion-based universities. By selecting a homogeneous sample, we can avoid outliers and bias in the data. Another benefit of using a homogeneous sample offer narrower but clearer generalizability (Jager et al., 2017). A more homogeneous population is more likely to provide a representative sample. The homogeneity of the sample also influences the generalizability of results to other populations with similar sociodemographic characteristics, as opposed to heterogeneous samples. The data in this research group shows no differences in either the average value or variance compared to other groups in the data set. The participants in this research are students currently enrolled at a religion-based university at any level of education - diploma, bachelor's, master's, or doctoral degrees. These students have provided verbal consent, which has been digitally registered prior to the survey.This characteristic limits the generalization of the results to the university context and other populations due to the relationship between the experiences of the research subjects and the variables in this study. Specifically, in the context of this study, it pertains to the religious background of the research subjects. The religious background could influence how the sample completes the homophobia questionnaire in this study. In addition to religion, homophobia is also impossible to analyze without referring to cultural norms related to gender and race (Wilets, 2016).

In the participant demographic table, participants' sociodemographics are explained based on gender, age, study program, and university of origin to clarify the participant's condition. A more detailed demography of the participants is described in the following Table 1.

Table 1
Demography of the participants.

Demography		Frequency	Percentage (%)
Gender	Male	109	33.3
	Female	218	66.7
Age	< 21	172	52.6
	21–25	112	34.3
	26–30	15	4.6
	31–35	2	0.6
	35 <	26	7.9
Program	Diploma program	3	0.9
	Undergraduate	273	83.5
	Master program	51	15.6
	Doctoral program	0	0
University	State university	98	29.97
	Private university	229	70.03

2.2. Data collecting instrument and procedure

The research protocol for the data-collecting procedure was approved by the authors' university ethics committee. The data-collecting instrument used for the current study was adapted from surveys in previous research (Klamen et al., 1999a), of which sixteen survey items were exercised to measure students' attitudes towards homosexuality. This instrument was chosen in this study because the items in this study are appropriate to the context of society in Indonesia where many participants still have conservative and fundamentalist views of religion and include elements of associated risk. With health (Klamen et al., 1999a). The items were mainly classified into three: approval (APV, item Q1-Q8), refusal (RFS, item Q9-Q16), and acceptance (ACC, item Q17). In addition, some demography questions were added, such as gender, age, and the study program that students took at the time of the survey to clarify the sociodemographic conditions of participants. The survey instrument was developed using a five-point Liker scale where students were asked to select one of five available alternatives for each statement, i.e. strongly agree (score = 5), agree (score = 4), neutral (score = 3), disagree (score = 2), and strongly disagree (score = 1). Except for item 17, the alternative included 'agree without any condition, agree with a certain condition, neutral, disagree under certain condition, totally disagree without any condition'. The original 12-item homophobia scale was written in English and possessed a high level of internal consistency (Cronbach's Alpha = 0.90) (Klamen et al., 1999b). After the ethics clearance was obtained from our university board, in the current study, the homophobia scale was administered online to students at religion-based universities, both state and private universities. Students were contacted individually or in a group to participate in the study. The research was conducted with voluntary student participation. Informed consent was obtained, ensuring participant confidentiality and explaining potential research risks. Participant confidentiality is closely related to anonymity (Wiles et al., 2008). In the context of this study, confidentiality means that the researcher does not discuss the information provided by the respondent with others (Wiles et al., 2008) and presents the findings by ensuring that the individual is not identified. (Ong & Weiss, 2000) explicitly. These principles were outlined in the informed consent, which participants agreed to in writing.

Data collection was carried out through an online survey using Google Forms so that it was effective considering that participants came from all regions of Indonesia and also made it easy to fill in so it didn't take too long. The survey was designed to be user-friendly and efficient, providing participants with information about the research purpose and their rights.

2.3. Rasch analysis

Rasch model analyses were carried out to examine 17 items of the homophobia scale. The analyses included the evaluation of Rasch Principal Component Analysis (PCA), the analysis of item and person reliability, and finally, the differential item functioning (DIF). Prior to Rasch analysis, all data collected were downloaded from the Google server and were tabulated in an Excel file. Then, using WINSTEP 4.5.1

application, the tabulated raw data were converted into log-odds unit (later is called logit) values. As a part of the Rasch analysis procedure, the logit values conversion was done to maintain equal length between two measurement units of the ordinal data (Mulyono et al., 2020; Ningsih et al., 2021). Then, the data were screened for missing values, outliers and appropriateness of the respondents' responses. Ben (Ben, 2020) asserts that it is common in a survey where respondents unintentionally may skip or incidentally miss to complete particular questionnaire items. Moreover, some respondents may not express their interest in responding to the statements in the questionnaire (Goh et al., 2010; Linacre, 2010). The missing values, outliers and inappropriate responses in the dataset are believed to affect the reliability of the data and the reporting of the current study (Ben, 2020). In Rasch everything can be predicted so that we can assess the psychometric properties of the homophobia scale more objectively.

In the current study, fit statistical analysis was performed to assess the appropriateness of response data and the outliers. Of 327 data, a number of 114 data were observed not to fit the Rasch analysis because their logit values were observed beyond the threshold −2 and + 2 (Huang et al., 2020). Linacre (Linacre, 2010), the misfit data were regarded as outliers and thus removed from the further statistical calculation. In the following session, we present the Rasch statistical analyses using the remaining 213 data (62 students from state religion-based universities and 151 students from private-religion-based university students). Several researchers (Mulyono et al., 2020; Ningsih et al., 2021) have argued that the minimum sample size for Rasch analysis is 50, and thus the total of 213 was still sufficient for the Rasch statistical analysis.

3. Result

3.1. Descriptive statistics for item and person

As discussed earlier, all the raw data were converted into logit value (LV) to maintain an equal-interval-types for each scale unit (Boone et al., 2014, 2016) so that the analysis could reflect a reliable and precise measurement of the survey data (Rusland et al., 2020). Table 2 below presents the logit values from the students' responses to the homophobia scale items, and Table 3 summarises the person and item descriptive statistics.

Table 2
Students responses to Homophobia scale items.

	Items	Logit value (LV)	SE
Q1	I enjoy making friends with homosexuals	0.54	0.08
Q2	Campus society should recognise homosexuality as normal	0.93	0.08
Q3	Campus society should accept homosexuals	0.60	0.08
Q4	The place where homosexuals gather and work should not be restricted or even be closed down	−0.91	0.08
Q5	Homosexuals are often treated unjustly in our campus society	0.23	0.08
Q6	I would feel comfortable studying and interacting with homosexuals at campus	−1.10	0.08
Q7	Homosexuals should have equal opportunity to study and to have social interaction with campus society	−0.78	0.07
Q8	There should be no reason to restrict the place where homosexuals study and collaborate	−0.40	0.07
Q9	Homosexuals should not be allowed to work with children or younger people in campus life	0.59	0.08
Q10	Homosexuality can be considered immoral	0.88	0.08
Q11	Homosexuality can be classified as a mental disorder	−0.42	0.07
Q12	Homosexuals with AIDS deserve their fate	0.44	0.08
Q13	Homosexuality endangers the university and campus society	−0.21	0.07
Q14	Students who are in favour of homosexuality tend to be homosexuals themselves	0.20	0.07
Q15	Whenever possible, I try to avoid homosexuals	0.16	0.07
Q16	I feel more negative about homosexuality since I learned about AIDS	−1.24	0.08
Q17	Overall, I personally accept homosexuality and homosexuals	0.50	0.08

SE = standard of error.

In the Rasch analysis, participants' responses to the questionnaire items are classified into person and item. Person classification reflects the classification of responses in reference to the respondent ability to respond to the items, and the item classification concerns with classification of responses in reference to the item ability to distinguish the participant responses. Both person and item statistics are reported in logits. As shown in Table 3, the mean score of the person was reported at −0.49 with a sample standard deviation (S.SD) of 0.66, while the mean score of the item was observed at 0.00 with an S.SD of 0.70.

In addition, Rasch item and person map was developed to visualise the distribution of respondents' responses and the difficulty level of questionnaire items. As shown in Fig. 1, the map is divided into two main areas: the distribution of the person logit on the left side and the distribution of items on the right side. The vertical line of the map concerns with the distribution of the number of people or items based upon their logit values. The vertical line of person area reflects more people responding to the item on the top, and fewer people respond on the bottom. In contrast, the vertical line in the item area shows the less item to agree on the top and more items to agree on the bottom.

Particularly in the item area, participants' responses were classified into five difficulty levels: very high level of item difficulty, high level, moderate level, low level, and very low level. For example, item Q17, '*Overall, I personally accept homosexuality and homosexuals*', was perceived as a high difficult item, indicating that student has a low level of acceptance of homosexuality and homosexuals in campus society.

3.2. Evaluation of Rasch PCA

Rasch PCA analysis was carried out to test the assumption of unidimensionality of the homophobia scale which states that (1) the easier the question, the more likely participants are to respond to the homophobia scale correctly, and (2) the greater the ability of participants, the greater the possibility they answered questions on the homophobia scale correctly. The assumption of unidimensionality is required to ensure that all the scale items only measure a single construct of homophobia (Yu, 2020). The analysis of Rasch PCA from the scale was done by assessing the raw variance of the scale items. It was found that the raw variance range of each variable was found greater than the PCA threshold of 20 % (the global scale = 42.4 %, the Approval subscale = 55.0 % and Refusal subscale = 48.2 %). The finding has indicated that the Rasch model measurement could explain the raw variance. More importantly, the residuals of the unexplained variants of PCA for the global scale and the two main subscales, i.e. APV and RFS, were included and considered very good criteria.

3.3. Reliability of item and person

The reliability assessment of item and person was done to evaluate the reproducibility of the item and person classification in a new sample (Chang et al., 2014) or on a certain latent traits continuum (Chan & Subramaniam, 2020; Ningsih et al., 2021). The reliability analysis has shown that the item reliability was observed at an excellent level (α >

Table 3
Descriptive statistics for person and item.

	Person statistics (N = 213)		Item statistics (N = 17)	
	Total score	Logit	Total score	Logit
Min	25.0	−2.20	401.0	−1.24
Max	72.0	1.62	779.0	0.93
Mean	44.6	−0.49	559.1	0.00
S.SD	8.9	0.66	123.6	0.70

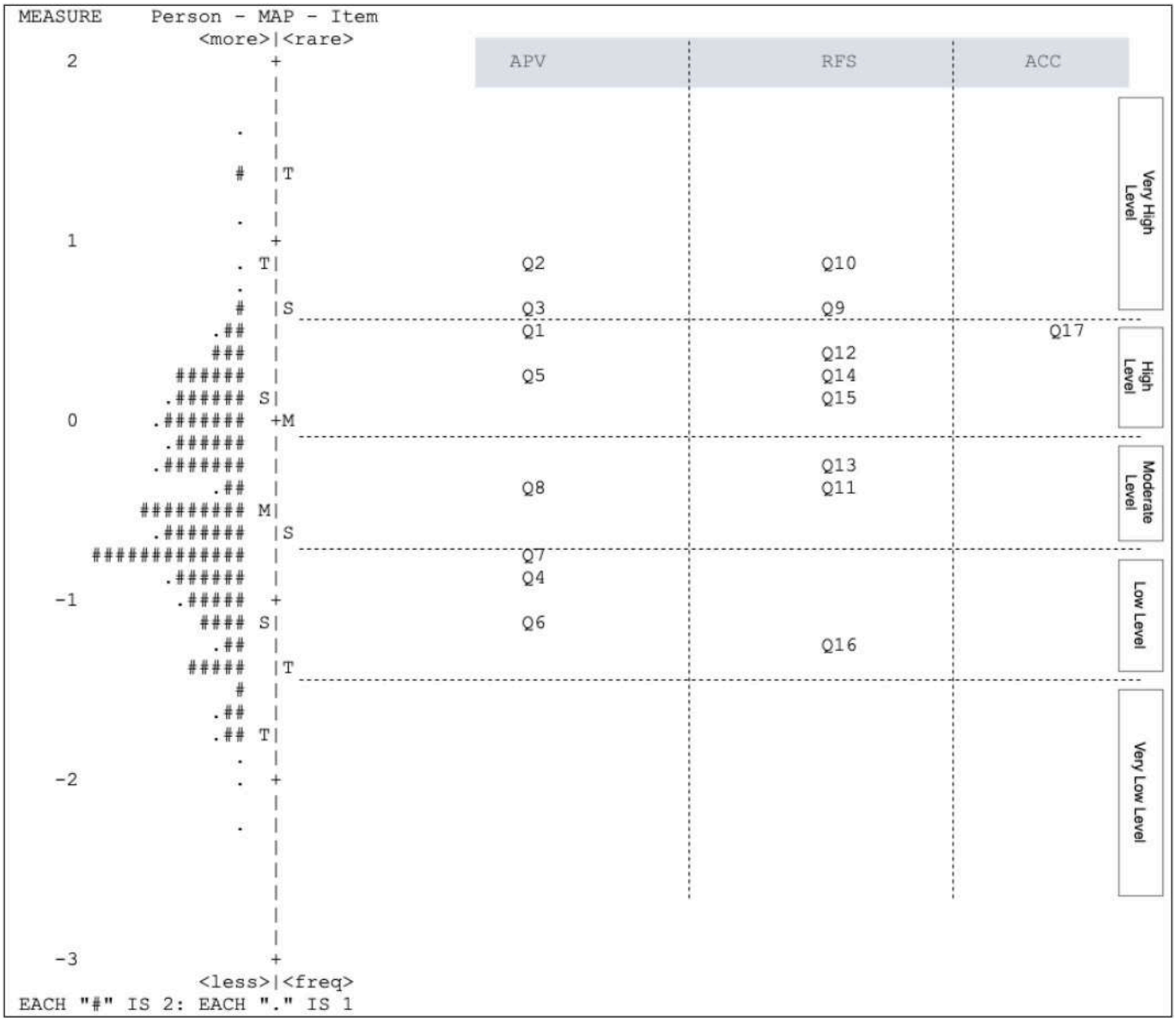

Fig. 1. Wright person-item map ($N = 213$).
"#" represents two persons; "." Represents 1 person. M_p: person mean; $S_{p\ G}$: one standard deviation of person mean; T_p: two standard deviations of person mean; M_i: item mean; S_i: one standard deviation of item mean; T_i: two standard deviations of item mean; (Approval (APV): Q1–8, Refusal (RFS): Q9–16, Acceptance (ACC): Q17).

0.90), and the reliability of person reliability was still at an acceptable level ($\alpha = 0.79$). The finding indicates that the person-reliability of the homophobia scale still maintain an acceptable level for its use within other new cohorts of a sample (Ningsih et al., 2021; Van Zile-Tamsen, 2017).

3.4. Differential item functioning (DIF) analysis for the scale items

In the current study, the DIF analysis was performed for each item scale to indicate the capability of participants from a certain group in responding to scale items compared to those from other groups (Chan & Subramaniam, 2020). A scale item is considered to exhibit DIF if the DIF contrast value is higher than 0.5 logits and a significant Rasch-Welch ($p < 0.05$). The analysis of DIF has shown potential DIFs for the scale item. All demography aspects reflect potential DIF for their items. Table 4 summarises the potential DIF on the scale item for each demography. In addition, Tables 5 and 6 exemplifies the DIF on gender and university demography, respectively.

As shown in Table 5, there was a significant difference between male and female participants in responding item Q10 '*Homosexuality can be considered immoral'*, and Q11 '*Homosexuality can be classified as a mental disorder*'. Female students were observed to be more capable of responding to the two items compared to the males. The finding also could be interpreted that female students seemed to have more negative perceptions about homosexuals than males. Moreover, as indicated in Table 6, students' responses to item Q8 '*There should be no reason to restrict the place where homosexuals study and collaborate*' and Q16 '*I feel more negative about homosexuality since I learned about AIDS*' revealed significant difference (DIF contrast >0.05 and $p < 0.05$). It indicated that students from state universities were shown to be more able to respond to the two items. It is interesting to highlight that although students from state universities tend to be supportive to homosexuals than those in private universities, they had negative views about homosexuality when it was associated with AIDS.

Table 4
Potential DIF on the scale item.

No	Demography		Number of items with potential DIF (N_{DIF})	Items
1	Gender	Male (1) Female (2)	2	Q10, Q11
2	Age	< 21 (1) 21–25 (2) 26–30 (3) 31–35 (4) 35 < (5)	14	Q2, Q4, Q5, Q7, Q8, Q10 Q11, Q12, Q13, Q14, Q15, Q16, Q17
3	Program	Diploma program (1) Undergraduate (2) Master program (3) Doctoral program (4)	9	Q5, Q6, Q7, Q8, Q10, Q11, Q13, Q15, Q16,
4	University	State university (1) Private university (2)	2	Q8, Q16

Table 5
DIF on scale item for gender.

Item	Gender	DIF measure	DIF contrast	t	p
Q10	1 2	1.31 0.74	0.56	2.83	0.00
Q11	1 2	−0.01 −0.59	0.57	3.50	0.00

Table 6
DIF on scale item for gender.

Item	University	DIF measure	DIF contrast	t	Probability
Q8	4 2	−0.23 −0.83	0.60	3.72	0.00
Q16	4 2	−1.05 −1.71	0.66	3.78	0.00

4. Discussion

The current study validated the homophobia scale comprising of 17 items using the data from religion-based university students in Indonesia. In general, the homophobia scale evaluated using Rasch model appears to have good psychometric properties. The assessment of PCA has shown that the scale only measures one single construct, i.e. homophobia among the students from the two cohorts of the sample. The assessment also showed that the unexplained variance of the residuals was reported under 15 %, suggesting that the scale items did not reflect another meaningful dimension other than homophobia.

The analysis of the item map also suggests that many items ($N = 10$) were considered difficult to respond (Logit value >0.00), and few items were regarded as easy ($N = 4$). The item map analysis also revealed that students had a positive perception about homosexuality and homosexuals. Although students thought that homosexuals should be given the freedom to study and have social interaction in the campus society, they disagree if the campus society should recognise homosexuality as normal and thus should not be accepted in the society. This could be influenced, among other things, by perceptions of discrimination by educational institutions (Richardot & Bureau, 2020) but on the other hand, the participants, all of whom have religious backgrounds and tend to be religious fundamentalists, still hold that homosexuality is unnatural and not accepted in Indonesia. In their view, homosexual behavior is considered a toxic relationship that can poison the behavior of those around them to follow their lifestyle as a gay person (Praptiningsih et al., 2020; Praptiningsih et al., 2024). This contrasts with the results of a study in Chile, where traditional values, social sanctions, and social rights are the three factors that contribute to the structural factors in the measurement of The Attitudes Towards Lesbians and Gay Men Scale (ATLG) (Cárdenas & Barrientos, 2008).

The religious background of the sample group strongly influenced their view on homosexuality and homophobia. For example, out of 329 participants, 322 had a Muslim background, which correlated with their attitudes. This relationship between religiosity and homophobia was also observed among undergraduate students, as reported by Wilkinson (2004). In Indonesia, Islam and Christianity strictly prohibit homosexuality, while Hinduism, Buddhism, and Confucianism lenient stance. This has a significant effect on homophobia, as supported by Balkin et al. (2009) who found that religious beliefs are a significant predictor of prejudice in homophobia. Although there is a relationship between religion and homophobia, religion itself is not always the main agent that constitutes homophobia behavior and sometimes does not contribute to homophobia at all (Wilets, 2016). A study in Ghana has shown that the media stimulates and perpetuates homophobia and heterosexism. The media is also used as a platform for politicians to gather support for reactionary interventions against homosexuality (Tettey, 2016). Additionally, the teachings of the religions in Indonesia, such as Islam, Christianity, Hinduism, Buddhism, and Confucianism, also promote tolerance towards fellow human beings. This implies that individuals with a sexual orientation disorder, such as homosexuals, still have the right to live their lives well, and religious adherents should respect them by giving them the same opportunities as other people to engage in activities related to the economy, health, and education, irrespective of their sexual orientation.

It's crucial to note that several scale items showed potential differential item functioning (DIF) based on participants' demographic characteristics. Specifically, potential DIF was identified in many items related to participants' age (NDIF = 14) and their study program (NDIF = 9). These findings suggest the need to revise the classification of age and study programs. The wide age range is attributed to participants coming from different levels of education—Diploma program, Bachelor's Program, Master's Program, and Doctoral Program—each with its own age range. Other research in nursing students at Midwestern University indicates that Midwestern culture has an impact on attitudes towards homophobia, as it does not support LGBT individuals (Dinkel & Patzel, 2007). Social factors such as sexual orientation, gender, and socio-economic status (Elk, 2021), as well as cultural factors influenced by participants' various ethnicities (Elk, 2021) across Indonesia, could also play a role.

In the study, it was found that female students had more negative views compared to male participants, which contradicts previous studies suggesting that males tend to be more tolerant of homosexuality in the context of AIDS. One of the reasons for this negative view is that being gay is perceived as deviant behavior and is seen as not in line with the religious and cultural norms in Indonesia (Moore, 2017). When discussing homosexuality, some participants with conservative views may feel uncomfortable. When it's associated with AIDS, there's concern about the possibility of contracting AIDS-related diseases, often caused by direct contact with individuals who are gay. This viewpoint was also observed in nurses, with female nurses feeling more uncomfortable serving individuals with gay and lesbian identities (11.4 % higher compared to male nurses at 6.1 %). (S. Neville & Henrickson, 2006). The same attitude is also shown by residential care, which although most men still show an attitude of avoiding accepting people related to sexual behaviors such as lesbians and gays (S. . Neville et al., 2015) Similar attitudes were observed in residential care, as most men tended to avoid accepting people associated with sexual behaviors such as lesbians and gays, out of fear as they consider homosexuality to be illegal and a form

of mental illness. This is contrary to previous research which showed men having a more negative attitude towards homosexuality in general due to traditional gender role views that oppose homosexuality and view it as deviant behavior (Monto & Supinski, 2015). In addition, students from state universities tended to be more supportive of homosexuals compared to those in private universities, but they held negative views about homosexuality when it was associated with AIDS. To address these differences in the future, it is necessary to retest with a larger and more diverse group of participants to minimize cultural differences and enhance cross-cultural validity.

The psychometric analysis of the current study indicates that the homophobic scale is acceptable (Cronbach's alpha = 0.79). However, this reliability is lower than that reported in previous studies (Ciocca et al., 2015; Moral-de la Rubia et al., 2015). It's important to note that there are differences in the traits of the homophobic scale assessed in this study compared to the scale in previous studies. For instance, (Moral de la Rubia & Valle de la, 2014) selected only 8 out of 12 items on the homophobia scale and modified the alternatives into seven responses, while Ciocca et al. (2015) had 25 items with three factors associated with homophobia, namely behavior/negative affect, affect/behavioral aggression and negative cognition. This difference explains the variance in reliability scores between these scales and the difference in the context of the study participants. The variation in responses by participants, particularly in questions such as Q2 and Q10, significantly impacts the reliability scores in this study. The different responses of the participants from Indonesia may be influenced by discriminatory factors carried out by religious institutions and educational institutions (Richardot & Bureau, 2020), especially given that the participants in Indonesia come from faith-based universities. Nevertheless, despite the variability in per-person reliability results, the item's reliability has shown satisfactory results, demonstrating an excellent level of reliability ($\alpha > 0.90$), slightly lower than the study conducted by Ciocca et al. (2015) (Cronbach's α coefficient of 0.92). Thus, the excellent reliability of this item suggests that the homophobic scale has excellent internal consistency (You et al., 2020).

Although there is a scale of homophobia in place, it does not indicate acceptance or support for homosexual behavior in Indonesia. This scale is used to measure public responses to increasingly visible homosexual behavior. Homosexuality is considered a personality disorder within Indonesian religious and cultural contexts. Measurements of homophobia can influence government decisions regarding the establishment of legal protections for individuals, families, and society with respect to LGBT behavior through legislation (Wieringa, 2019). It is stated in Indonesia Constitution Article 27, paragraph (1) that "every citizen has an equal position before the law and the government." Furthermore, Article 28D (1) states that "each and every person has the right to recognition, security, protection, and certainty based on fair and equal treatment before the law," and Article 28E(3) reads that 'everyone has the right to freely associate, assemble, and express their opinion.'. Universities, whether religious-based or non-religious, should be able to create a comfortable public space for everyone to interact, engage in activities, and develop talents and achievements without exception.

Many non-religious universities explicitly forbid the presence of LGBT individuals on campus. It is imperative that all universities take steps to combat homophobia in order to prevent it from escalating into prejudice and violence (Wieringa, 2019). The results of this research will empower religious universities to establish regulations prohibiting the spread of hate or hate speech related to homosexuality. The academic community of religious universities must adhere to educational values aimed at fostering understanding, self-awareness, tolerance, moderation, compassion, and progressiveness. Measures to prevent acts of homophobia should be enhanced within the environment of faith-based universities, providing opportunities for creative expression and supporting students in their coursework to enable positive interactions among homosexual individuals.

Since the Yogyakarta Principles were released in 2007 as global guidelines for efforts to eliminate stigma and discrimination for LGBT groups (Principle On the Application of International Human Rights Law in Relation to Sexual Orientation and Gender Identity), the Indonesian Government has not taken concrete efforts to implement the principles Yogyakarta Principle. The existence of LGBT organizations in Indonesia invites polemics and is still a controversy of pros and cons in society. In student groups, they are divided into three categories, namely: the first group is pro-LGBT supporters. This group accepts the existence of LGBT people. The second group is a neutral team that responds to LGBT without any reaction in the gray area and tends not to care about the existence of LGBT. Third, counter or anti-LGBT groups who strongly oppose activities related to LGBT. The last group is the largest in Indonesia, due to the fact that same-sex marriage in Indonesia is not legalized by the Indonesian Government.

5. Conclusions and recommendation for further research

The level of homophobia in Indonesia is closely linked to the acceptance of the LGBT community. The background of the participants, whether they are students from state religion-based universities or private religion-based universities, has an influence on the results of the measurement of this homophobia scale. The religious and cultural teachings that prevail in Indonesia play an important role in shaping these attitudes. Some students still perceive homosexuality as deviant behavior, but they display positive behavior to support the rights of homosexuals to interact and participate in social life. However, the assessment of the homophobia scale has some limitations. It's important to expand the type and scope of assessment to allow for wider generalization. Research on this topic has only begun in Indonesia, so the data reported here should be considered a starting point.

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CRediT authorship contribution statement

Novi Andayani Praptiningsih: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Data curation, Conceptualization. **Herri Mulyono:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Data curation. **Silvie Mil:** Writing – review & editing, Writing – original draft, Resources, Investigation. **Syaiful Rohim:** Writing – review & editing, Writing – original draft, Methodology, Investigation. **Benni Setiawan:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation.

Declaration of competing interest

All authors have no conflict of interest to declare.

Data availability

No data was used for the research described in the article.

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