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Measuring attitudes toward plagiarism: issues and psychometric solutions

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Measuring attitudes toward plagiarism: issues and psychometric solutions

Abstract

Purpose - The purpose of this paper is to address the issue of failing to psychometrically test questionnaire instruments when measuring university students' attitudes towards plagiarism. These issues are highlighted by a psychometric evaluation of a commonly used (but previously untested) plagiarism attitudinal scale.

Design/methodology/approach - The importance of psychometric testing is shown through an analysis of a commonly used scale using modern techniques (e.g. Rasch analysis) on 131 undergraduate education students at an Australian university. **Findings** - Psychometric analysis revealed the scale to be unreliable in its present form. However, when reduced to an eight-item subscale it became marginally reliable. **Research**

limitations/implications - The main implication of this paper is that questionnaire instruments cannot be assumed to function as they are intended without thorough psychometric testing. **Practical implications** -

The paper offers valuable insight into the psychometric properties of a previously untested but commonly used plagiarism attitudinal scale. **Originality/value** - The paper offers a straightforward and easy to

understand introduction to researchers in higher education who use questionnaires/surveys in their research but lack an understanding of why psychometric testing is so critical. While similar papers have been written in other fields which advocate psychometric approaches, such as Rasch analysis, this has not been the case in higher educational research (or mainstream educational research for that matter).

Keywords

measuring, attitudes, psychometric, toward, solutions, plagiarism, issues

Disciplines

Education | Social and Behavioral Sciences

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Measuring attitudes toward plagiarism: Issues and psychometric solutions

Plagiarism, or when students copy others' work and pass it off as their own, is a serious form of academic misconduct (Brimble and Stevenson-Clarke, 2005; Sheard *et al.*, 2002; Vuori *et al.*, 2004). At worst, intentional forms of plagiarism represent outright cheating and raise questions about the validity of the higher education degrees that are awarded. At best, unintentional plagiarism threatens academic integrity and student learning. Despite this, one study (Cavall Limited, 2002) found that nearly 14% of Australian undergraduate students submitted work that had evidence of plagiarism (O'Connor, 2003). Furthermore, it is widely acknowledged that plagiarism rates are likely higher than has been reported (Selwyn, 2008) and that these incidence rates are on the rise (Devlin, 2006; Marsden *et al.*, 2005; Park, 2003; Stoney and McMahon, 2004; Taylor, 2003; Walker, 1998). The importance of this issue is evidenced by the media attention it has received in Australia (cf., Cohen, 2003).

While a number of recent studies in Australian universities have investigated plagiarism (Egan, 2008; Ryan *et al.*, 2009; Sheard *et al.*, 2002; Yeo, 2008), there is a paucity of

empirical research investigating plagiarism in an Australian context (Brimble and Stevenson-Clarke, 2005). Moreover, the Australian plagiarism research that exists has been criticised for its lack of rigour, particularly in the case of survey or questionnaire-focused research. For instance, Gururajan and Roberts (2005) found that no reliability checks were undertaken on the questionnaire instruments used in plagiarism studies in Australia. Further studies (e.g., Brimble and Stevenson-Clarke, 2005; Egan, 2008; Marshall and Garry, 2005; Ryan *et al.*, 2009; Sheard *et al.*, 2002; Song-Turner, 2008; Yeo, 2008) support this assertion. Each of these studies utilised survey instruments to quantify perceptions and attitudes toward plagiarism, yet the basic psychometric properties of the instruments used were not reported.

Issues with Omitting Psychometric Analysis when Measuring Attitudes Toward Plagiarism

The tendency in Australian plagiarism research has been to examine participants' Likert scale responses to a range of scenarios dealing with plagiarist behaviour and related factors (e.g., penalties for plagiarist behaviours, knowledge of others' cheating, collaborating with peers, etc). Without a thorough investigation of these questionnaires' psychometric properties, however, it remains unclear what construct(s) are being measured and whether the questions are measuring these construct(s) in a consistent way across respondents. Despite this, the majority of recently published Australian plagiarism studies omit any discussion of the psychometric properties of the measures adopted (Brimble and Stevenson-Clarke, 2005; Egan, 2008; Ryan *et al.*, 2009; Sheard *et al.*, 2002; Song-Turner, 2008; Yeo, 2008). Thus, despite the often-extensive sample sizes and potentially important results of these studies, the lack of reliability checks cast doubt on any interpretation of the findings.

To illustrate this point, consider the case of a set of survey questions aimed at identifying students' beliefs about how severe penalties for plagiarism should be. Although this undertaking is seemingly straightforward, a number of factors can influence students' responses to these questions (e.g., phrasing, interpretation and/or ordering of the questions, respondent fatigue, etc.) For instance, a student might indicate their genuine belief in the need for harsh penalties for plagiarism on early survey questions, but appear inconsistent in this stance on later questions (e.g., due to unclear phrasing and misinterpretation, rapid or incomplete reading of an item due to respondent fatigue, etc.).

This issue becomes even more problematic when the measurement construct, in this case an attitude toward plagiarism, is being used in complex ways. Consider an attempt to gauge respondents' attitudes toward plagiarism by measuring their preference for harsh or soft 'penalties' for plagiarist behaviours. If a scale is designed to measure the construct of

attitudes toward plagiarism (e.g., respondents' perceptions regarding the seriousness of plagiarism and plagiarist behaviour), when the notion of 'punishment' is introduced a new dimension is created. That is, the construct being measured may become obfuscated by participants' attitudes toward punishment.

This is problematic insofar as respondents will have varying attitudes for a variety of different behaviours - a principle that extends even beyond plagiarist behaviour. To explain, some respondents will have fairly 'soft' (less harsh) attitudes toward penalising inappropriate behaviours, whereas others will have more severe attitudes toward penalties in general (one need only look to debates surrounding the death penalty as evidence of this). In terms of penalties for plagiarism, for example, one could assume that this would manifest as a negative correlation (i.e., less tolerance for plagiarism would lead one to call for more severe penalties, and vice-versa).

In such cases, however, there is no certainty as to whether an individual's responses are reflective of a genuine attitude toward plagiarism or perhaps more reflective of an attitude toward the construct of punishment for misdeeds (or both). If the latter, then interpreting participants' responses without any psychometric investigation would be misleading at best (as responses to the item do not consistently reflect an attitude toward plagiarism, *per se*). If, on the other hand, a psychometric analysis identifies that there is an issue with the way the instrument is functioning then measures can be taken to address these problems. Alternatively, if the psychometric analysis reveals that the instrument is functioning well and that the items comprising the instrument are also functioning in line with expectations, then it can be assumed that the instrument is measuring what it was intended to measure.

Neglecting to undertake a thorough psychometric analysis of attitudinal scales or questionnaire instruments, however, assumes without evidence that the chosen scale(s) function as intended. This highlights a concerning trend in Australian higher educational research, which indicates a pattern of survey use and reporting that is in need of change. That is, researchers need to take a more rigorous approach to their investigations by conducting thorough psychometric tests on the survey instruments used in their studies. In support of this point, Gururajan and Roberts (2005) argue that 'concrete evidence,' defined as data collected by using rigorously tested psychometric instruments, is yet to be attained on Australian students' attitudes and perceptions of plagiarism. Indeed, there is a clear need for the construction of a standardised and validity-tested plagiarism attitude measurement instrument that can be used internationally for comparative studies (although for one possible candidate, see Mavrincac *et al.*, 2010).

Psychometric Characteristics of Good Surveys

The psychometric characteristics of good surveys are that they are reliable and valid (Squires *et al.*, 2013). Reliability indicates that the survey instrument is consistent in measuring the construct under investigation. That is, scores produced by the measurement instrument should be reproducible across different samples (John and Benet-Martinez, 2000). In psychological and social science research the reliability of survey instruments is usually measured by a statistical technique known as coefficient alpha (Cronbach, 1951, cited in John and Benet-Martinez, 2000). This index identifies how closely items on the scale are related to each other. The assumption is that if items are closely related to each other then the strength of this relationship will elicit similar responses across similar samples of respondents.

However, while coefficient alpha can indicate the degree of relationship between items (or rather their inter-item correlations) this is neither an indication of the homogeneity of the items nor the unidimensionality of the scale (John and Benet-Martinez, 2000). Instead, it is possible that items may be strongly related to each other but are representative of different constructs. As an analogy, baboon behaviour is closely related to human behaviour but a baboon is clearly not a human being. In a psychometric context, survey instruments may have individual items that, while related to each other, can be representative of fundamentally different constructs than those that initially were to be measured. For instance, the strength of ethical values that constrain plagiarist behaviours may well correlate with beliefs about the necessary severity of punishment for plagiarism, yet this does not indicate that both are a product of the same underlying construct.

It is therefore important to extend psychometric analyses beyond the calculation of coefficient alpha, instead testing in a more comprehensive manner the unidimensionality of a psychometric scale. In fact, the most important aspect of any form of psychometric measurement (cf., John and Benet-Martinez, 2000) is that the scale (or sub-scale) and all the items comprising the scale are measuring the same construct and ideally nothing else. A major advantage of conducting a psychometric analysis on an attitudinal questionnaire or survey is that it will identify those questions that work well together to capture the construct of interest, and which questions do not. Those questions that are functioning atypically can be either modified or omitted from the analysis if they fail to elicit levels of the measurement construct in a consistent and reliable way.

Both traditional test theory and modern test theory approaches can identify particular questions (items) that do not fit the questionnaire or survey instrument. In traditional test theory approaches like factor analysis, this is indicated predominantly by correlations

between items, the strength of which suggest whether items are measuring related phenomena (or constructs; Field, 2009). Factor analyses are therefore carried out to determine the extent to which particular items comprising the instrument cluster together to form factors (i.e., latent variables), in order to reduce the questionnaire to its underlying constituent components (the dimensions of the construct being measured). For instance, a recent factor analysis on the 12-item Plagiarism Attitude Scale (Harris, 2001) indicated a single dimension (factor) of the scale (Gururajan and Roberts, 2005). This factor was described as ‘justification to plagiarise’. The scale, which comprised six-items, had an acceptable reliability coefficient of .74. As a result, only these six items were used in subsequent analyses (Gururajan and Roberts, 2005).

The Rasch Model, which is a member of the family of models that constitutes Modern Test Theory, is used to not only govern the construction of a measurement scale; but it can also be used to validate the scale. Although a complete discussion of Rasch modelling is beyond the scope of the current paper (for a comprehensive description see Bond and Fox, 2001), the basic premise is that Rasch models are models of intent. They are used to govern the construction of the measuring instrument and then provide analytical data as to whether the questions comprising the scale have worked in the way intended. Rasch analysis makes explicit anomalies in the data that are obtained from the instruments that are used to construct the measurement scale.

Current Study

Given the state of concern regarding the quality of research conducted on students’ attitudes and perceptions of plagiarism in Australian university settings, the current study seeks to evaluate the psychometric properties of a commonly used plagiarism attitude scale that is yet to be psychometrically evaluated. The 12-item Plagiarism Attitude Scale by Harris (2001) was chosen for two main reasons: 1) it has been used in a number of studies on plagiarism both in Australia and internationally (e.g., Ambery *et al.*, 2005; Egan, 2008; Gururajan and Roberts, 2005; Harris, 2001; Mavrinac *et al.*, 2010; Pupovac *et al.*, 2010); and 2) there has been no psychometric analysis of this scale (Mavrinac *et al.*, 2010) using the Rasch Model.

Although the Plagiarism Attitude Scale has been psychometrically tested using Traditional Test Theory (primarily factor analytic techniques; e.g., Gururajan and Roberts, 2005), the Rasch Model has been shown to be more comprehensive and informative (cf., Clark and Watson, 1995; Maydeu *et al.*, 2011; Reise and Henson, 2003; Waugh and Chapman, 2005) because it is a measurement model. That is, Rasch analysis is considered

more appropriate for scale development and evaluation because it can provide detailed information about how particular items function relative to the level of the latent trait under investigation. In this study we use a combination of Traditional Test Theory and the Rasch Model in order to provide a more comprehensive evaluation of this measurement instrument (see Bartholomew *et al.*, 2011; Raju *et al.*, 2002).

Method

Participants

One hundred and thirty-one undergraduate students enrolled in education subjects at an Australian university completed the Plagiarism Attitude Scale and a second questionnaire containing basic demographic information. Most students were enrolled in their first year of study ($n = 118$), with 12 in second year and one fourth-year student. There were significantly more females ($n = 106$) than males ($n = 25$), which is representative of the broader Bachelor of Primary Education program. All students were young adults of around the same age (females: $M = 21.02$, $SD = 4.57$; males: $M = 21.32$, $SD = 4.43$). Most students were from English speaking backgrounds ($n = 125$) while six were not.

Instrumentation

The Harris (2001) Plagiarism Attitude Scale consists of 12 questions designed to measure young adults' (high school and undergraduate university students) feelings about plagiarism. The available responses to these questions, based on a five-point Likert scale, were *Strongly Agree*, *Agree*, *Neutral*, *Disagree*, and *Strongly Disagree*. In order to score depth of feeling toward the construct of plagiarism we scored these items as following: Strongly Agree = 4, Agree = 3, Neutral = 2, Disagree = 1, Strongly Disagree = 0. In this way, respondents with soft (or less serious attitudes) toward plagiarism would score higher than those who had harder or more severe attitudes toward plagiarism. Total scores could range from (0 – 48).

Although there is no information on which items require reverse scoring (see Harris, 2001), questions 2, 3, 7, 8 and 12 were ultimately reverse scored. The direction of scoring was clear for most items; however, one case (question 12 - *If students caught plagiarizing received a special grade for cheating (such as an XF) on their permanent transcript, that policy would deter many from plagiarising*) could arguably be scored in either direction. That is, those with softer attitudes toward plagiarism may respond the same as those with harder attitudes and vice versa. Hence, in order to determine the best direction for scoring this item, several analyses were run in both directions and the direction that revealed the best fit was retained. In this case item 12 was reverse scored.

Procedure

Undergraduate students in attendance at pre-identified education subjects were approached at the end of their lecture. Students who volunteered to participate in the study were made aware that the survey was anonymous and that their lecturers would not have access to their data. Furthermore, participants were made aware that the questionnaire was about their attitudes toward plagiarism and not whether they had committed plagiarism at any point. Both the Plagiarism Attitude Scale and the demographics questionnaire were completed by pen and paper and all instruments were administered and collected by the investigators.

Results

Descriptive statistics of responses are provided in Table 1. The data from the Plagiarism Attitude Scale were analysed using (1) exploratory factor analysis, (2) Cronbach alpha reliability testing, and (3) Rasch analysis. An exploratory factor analysis was conducted to determine if the scale had multiple dimensions and to identify any potentially problematic items. We additionally ran traditional Cronbach alpha tests to determine the scale's reliability. Finally, Rasch analysis was conducted to determine whether the individual items of the Plagiarism Attitude Scale functioned as intended.

Insert Table 1 here

Exploratory Factor Analysis

An exploratory factor analysis (EFA) using maximum likelihood estimation and an oblique factor rotation (direct oblimin) was run on the 12 items of the Plagiarism Attitude Scale. This method of factor rotation was justified by the presence of significant inter-item correlations (see Table 2). The Kaiser-Meyer-Olkin (KMO) measure indicated adequate sampling, $KMO = .702$ ('good' according to common rules of thumb; Field, 2009), and all KMO values for individual variables revealed all elements at acceptable levels (all $> .5$; Field, 2009). Bartlett's test of sphericity was significant, $\chi^2(66) = 284, p < .001$, indicating that correlations between items were sufficiently large to justify EFA analysis.

Four factors displayed Eigenvalues explaining 44% of the variance, however, examination of the scree plot suggested that a two-factor solution would be optimal. Only 13 (19%) of non-redundant residuals had absolute values greater than .05 indicating a good factor solution. Subsequent examination of factor loadings suggested that a 4-factor solution was optimal, although two factors were defined by a single item (see Table 3). These factors

can be interpreted as: 1) punishment for plagiarism; 2) proper use of others' work; 3) proper use of own work; and 4) ethics and exceptions. However, that five questions did not load well (regression coefficients $< .4$) indicated the problematic nature of this questionnaire, as currently constituted.

Insert Table 2 & 3 here

Reliability Analysis

Because so few items loaded onto the four-factor solution of our EFA, we did not run traditional reliability analysis separately for each subscale. Instead, an overall reliability test on the omnibus scale yielded a Cronbach alpha of .69 (indicating poor internal reliability). Removal of Question 7 increased the alpha to a more acceptable level (.71).

Rasch Modelling

In order to investigate the effectiveness of the Plagiarism Attitude Scale a Rasch analysis was conducted using Rasch Unidimensional Measurement Modelling (RUMM) 2020 software (Andrich *et al.*, 2005). The RUMM programme gives a set of summary fit statistics which are used to interpret how well the questions of the attitude scale function according to the expectations of the Rasch model. These summary-fit statistics consist of an Item-Trait interaction (a measure of the extent to which the data fit the model of which one requirement is unidimensionality); a Person Separation Index (PSI), which is a measure of internal consistency similar to a Cronbach's alpha (where there is no missing data); as well as overall person and item mean fit residuals (residuals are the extent to which person's actual responses and the theoretically derived expected responses differ).

Individual item fit is determined by fit residuals with acceptable ranges (between -2.5 and +2.5). Additionally, Chi-square and F-test statistics are also given, where the null hypothesis is that items fit the model well. Hence, significant p values indicate misfit. Finally, the functioning of the response categories can indicate misfit. In the scale, there are five possible response categories with four thresholds (or points between them). Ordered thresholds are those which reflect logical response choices relative to the person's levels of the latent trait being measured.

Initial analysis revealed that the scale did not meet basic psychometric requirements of unidimensionality, reliability and construct validity. Furthermore, Questions 5, 7, 8 and 12 demonstrated misfit while Questions 3, 5, 7, 8, 11 and 12 had disordered thresholds indicative of unpredictable and erratic response choices. In its present form the data cast doubt on the ability of the full scale to reliably measure attitudes of severity on the construct of plagiarism. However, in order to determine if the psychometric properties of the scale could be improved,

a second Rasch analysis was run after ordering the response categories of items with disordered thresholds and removing misfitting items.

After items with disordered thresholds were rescored (collapsed into smaller categories) (see Figure 1) and four items were removed (Questions 5, 7, 8 and 12) the psychometric fit of the data to the Rasch model indicated an acceptable internal reliability (PSI = 0.70). An insignificant Item-Trait interaction ($\lambda^2 = 30.60$, $p = .540$) indicated that the subscale was functioning according to the model and provides evidence of unidimensionality. While, the overall item locations showed somewhat poor fit to the model ($M = 0.20$, $SD = 0.62$), the overall person locations fared better ($M = -0.30$, $SD = 1.04$). No individual item misfit was found with the remaining eight items (see Table 4). For further information regarding this analysis contact the authors.

Insert Figure 1 & Table 4 here

Discussion

Using both Traditional Test Theory and Modern Test Theory, our analysis of the Harris (2001) Plagiarism Attitude Scale revealed that it has unreliable psychometric properties in its present form. This casts doubt on the reliability of findings attained by studies that have used this instrument in its entirety (e.g., Egan, 2008). Using Traditional Test Theory analyses, the results of our factor analysis revealed that five questions did not load onto any of the four observed factors (questions 1, 2, 3, 7 and 12). This indicates that these questions have no relationship with the four main dimensions of the scale we identified (i.e., punishment for plagiarism, proper use of others' work, proper use of own work and ethics and exceptions). Of the questions that did load onto the four factors, only one item loaded onto each of the first two factors, whereas two and three items defined the third and fourth factors, respectively. This is problematic insofar as there are too few items to reduce the scale into workable subscales for further analysis.

These results are at odds with the results of Gurarajan and Roberts (2005), who found a two-factor solution and were able to reduce the Harris scale into a 6-item subscale. This difference in results may be attributable to the choice of rotation methods used in their factor analyses. In the Gurarajan and Roberts (2005) study they used Varimax (orthogonal rotation), which assumes that the items are uncorrelated. Given the clear correlations between a number of items, this decision may have unduly influenced the items to more clearly cluster together. In contrast, the oblique rotation was adopted in the current study because of numerous strong inter-item correlations (see Table 2).

Furthermore, differences in the factor analytic results may be attributable to the heterogeneity of the sample populations surveyed. While our sample ($N = 131$) was comparable in size to Gurarajan and Roberts ($N = 135$), there were differences. For example, our sample consisted solely of undergraduate education students studying domestically at an Australian university. By contrast, Gurarajan and Roberts' sample consisted of a mix of International ($n = 87$) and domestic undergraduate IT students ($n = 48$). Prior research has found significant differences in responses on the Plagiarism Attitude Scale (Harris, 2001) between International and domestic students studying at Australian universities (cf., Egan, 2008). Consequently, this may have resulted in the discrepancies in results between these two factor analyses.

Using Modern Test Theory analyses, our Rasch analysis indicated that four items were not functioning to the expectations of the Rasch Theory (Question 5: *Plagiarism is justified if the professor assigns too much work in the course*; Question 7: *If a student buys or downloads free a whole research paper and turns it in unchanged with his or her name as the author, the student should be expelled from the university*; Question 8: *Plagiarism is against my ethical values*; and Question 12: *If students caught plagiarizing received a special grade for cheating (such as an XF) on their permanent transcript, that policy would deter many from plagiarizing*). However, once these items were removed the scale's psychometric properties improved from poor to marginally acceptable. Importantly, when these four questions were removed Rasch analysis revealed that the overall fit to the theory improved. This suggests that these four items were the major contributing factors to the scale's initial multi-dimensionality. That is, these questions were measuring constructs other than attitudes toward plagiarism.

In line with these findings, Harris (2001) also reports that in his study Question 8 was problematic, in that respondents claimed that plagiarism was against their ethical values, yet also indicated their belief that plagiarist behaviour is acceptable under certain circumstances. As questions 5 and 8 loaded onto the same factor in our EFA, and that both questions were found to misfit using Rasch analysis, our findings parallel those of Harris (2001). One possible interpretation of these findings is that one's sense of ethical values is not 'monolithic' or fixed. That is, ethical values are fluid in the sense that they are susceptible to change under certain circumstances. For example, one can have ethical values against an issue, say the use of violence, and yet at the same time feel that the use of violence is justified if it prevents a serious catastrophe or event. Similarly, it is possible to have the belief that

plagiarism is against one's set of ethical values but feel that such behaviour is justifiable if student workloads are exceedingly high.

Further problems were found with questions 7 and 12. While these questions did not load onto any factors in our exploratory factor analysis, they were seemingly related in the sense that they both dealt with harsh consequences for plagiarist behaviour (i.e., expulsion from university, application of an identifying grade for instances of plagiarism). Earlier in the paper we argued that when an attitude toward plagiarism is embedded in a question with a penalty association, multiple philosophical dimensions emerge that confound analysis and interpretation of responses. That is, if a respondent is questioned on the appropriateness of a penalty for plagiarist behaviour then they are effectively being questioned on two distinct constructs: 1) an attitude toward plagiarism; and 2) an attitude toward severity of penalties for inappropriate behaviour. That Rasch analysis indicated that questions 7 and 12 misfit suggests that respondents were responding to these questions in a manner that was inconsistent with their overall pattern of responding (e.g., displaying more leniency in these instances, despite their previously stated strong stance against plagiarism). In other words, the items failed to discriminate properly between respondents with harsh or soft attitudes toward plagiarism. When these questions (as well as questions 5 and 8) were removed, the psychometric properties of the scale (particularly the measures of unidimensionality) improved to acceptable levels. The advantages of a psychometric approach to inform interpretation of the results are again highlighted here; without such an approach is to invite potential misinterpretation of the data.

Overall, an 8-item version of the Harris (2001) Plagiarism Attitude Scale (questions 1, 2, 3, 4, 6, 9, 10 and 11) met minimum requirements of internal reliability, unidimensionality and construct validity. Yet despite these results, we recommend continued caution when using the scale in this format. This is because these findings require replication using the revised scale (because the presence and order of items has the potential to generate a responding bias) and with additional samples. For instance, the generally poor psychometric performance of the full scale may have been related to students' general confusion with the measurement construct. That is, the majority of respondents (70%) admitted to not having a good grasp of what plagiarism actually means, which is perhaps attributable to the fact that the majority of our sample were in the early stages of higher education. This finding is consistent with other studies, however, which have found that a broad range of undergraduate university students are confused as to what plagiarism and plagiarist behaviour entails (Crisp, 2007; Marshall and Garry, 2005). Nevertheless, that nearly three-quarters of our sample

admitted to not having a good grasp of what plagiarism is may have had an adverse impact on the psychometric properties of the scale. That is, if our respondents lacked a clear interpretation of the concept of plagiarism, as a consequence the students (as a group) may have indicated attitudes toward highly divergent activities (e.g., copying full papers; copying taking paragraphs of text word-for-word without proper acknowledgement of the source; copying even a single sentence word-for-word without acknowledging the source; paraphrasing without acknowledgement of the source). If this was the case, arguably better psychometric results of the scale may be attained with a more informed participant sample (such as post-graduate students, who are suggested to be better informed on matters of plagiarism than undergraduates; see Ryan *et al.*, 2009).

Implications for Future Research

The investigation of university students' (and other stakeholders') attitudes and beliefs toward plagiarism is of critical importance to inform the proactive and reactive actions of educators, practitioners, and policy makers. Given the central role of research in informing these actions, it is critical that the research instruments (e.g., survey, questionnaire) used to measure such attitudes are reliable and valid. Using the Plagiarism Attitude Scale as an example, we demonstrated the pitfalls of failing to evaluate the reliability of survey instruments. As evidenced by our study, one cannot simply assume that a survey tool is functioning as intended unless it has been thoroughly psychometrically tested using a combination of both traditional (coefficient alpha and factor analyses) and modern approaches (e.g., Rasch analysis). These psychometric findings of the Plagiarism Attitude Scale can be used to guide future administration and adaptation of this and other scales to improve the quality of collected data.

Conclusion

In this paper we have addressed two important issues relevant to educational research, which continue to be particularly problematic among Australian studies of plagiarism in higher education. First, we outlined the need for increased rigour when conducting survey research on university students' attitudes toward plagiarism. Specifically, we advocate psychometrically testing the instruments used in this research and, importantly, reporting these measurement statistics. Second, we provided a psychometric evaluation of a commonly used plagiarism attitudes scale in order to improve future research involving the collection and interpretation of attitudinal data. While our psychometric investigation of the Harris (2001) Plagiarism Attitude Scale provides only initial insights into the psychometric properties of this scale, with our analysis suggesting that it is marginally reliable when an

appropriate subscale is used, we believe this approach represents an important step toward the increased rigour necessary to properly investigate the important issue of plagiarism within Australian universities.

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Figure 1. Threshold map of the Plagiarism Attitude Scale after collapsing disordered response categories.

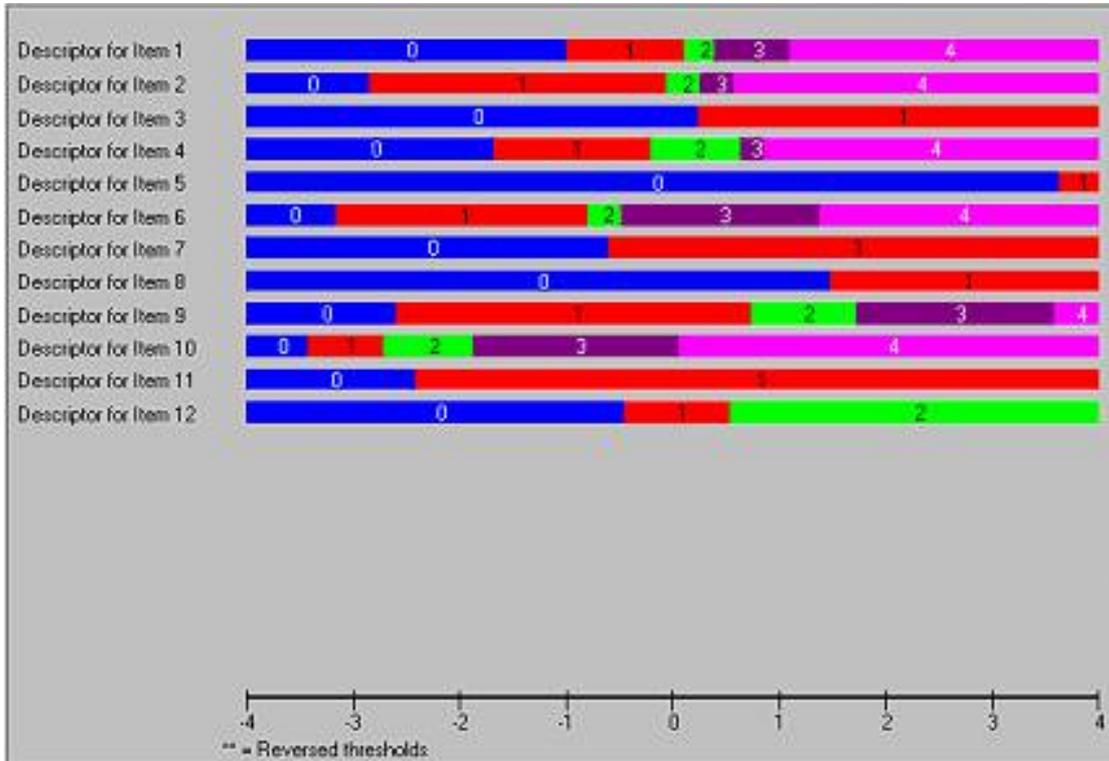


Table 1
Descriptive Statistics for the Plagiarism Attitude Scale

#	Item	M	SD	%Agree
1	Sometimes I feel tempted to plagiarize because so many other students are doing it	1.77	0.87	4.6
2	I believe I know accurately what constitutes plagiarism and what does not	2.27	0.89	9.9
3	Plagiarism is as bad as stealing the final exam ahead of time and memorizing the answers	2.37	1.12	17.6
4	If my roommate gives me permission to use his or her paper for one of my classes, I don't think there is anything wrong with doing that	2.02	0.89	6.1
5	Plagiarism is justified if the professor assigns too much work in the course	1.67	0.65	0.8
6	The punishment for plagiarism in college should be light because we are young people just learning the ropes	2.60	0.97	19.1
7	If a student buys or downloads free a whole research paper and turns it in unchanged with his or her name at the author, the student should be expelled from the university	2.56	1.15	29.0
8	Plagiarism is against my ethical values	2.08	0.77	6.1
9	Because plagiarism involves taking another person's words and not his or her material goods, plagiarism is no big deal	1.94	0.63	1.5
10	It's okay to use something you have written in the past to fulfill a new assignment because you can't plagiarize yourself	3.69	0.94	64.9
11	If I lend a paper to another student to look at, and then that student turns it in as his or her own and is caught, I should not be punished also	3.56	1.07	64.9
12	If students caught plagiarizing received a special grade for cheating (such as XF) on their permanent transcript, that policy would deter many from plagiarizing	2.34	0.89	7.7

Note. %Agree = proportion of respondents that indicated agreement or strong agreement with this statement.

Table 3*Exploratory factor analysis of the Plagiarism Attitude Scale - Pattern Matrix*

	Factor			
	1	2	3	4
Q1. Sometimes I feel tempted to plagiarise	-.06	-.19	.15	.28
Q2. I know what plagiarism is	.25	-.14	.04	.29
Q3. Plagiarism is as bad as stealing an exam	.18	.06	.37	.27
Q4. Using others' work with their permission is ok	-.04	-1.03	-.01	-.07
Q5. Plagiarism is ok if the Professor gives you too much work	.02	.05	.05	.51
Q6. Punishment for plagiarism should be light	1.02	.03	.13	-.04
Q7. Downloaded papers and using as one's own should mean expulsion from university	.16	-.03	-.18	-.00
Q8. Plagiarism is against my ethical values	-.09	-.02	-.13	.65
Q9. Plagiarism involves taking others' words, not property, so it's no big deal	.27	-.14	.15	.49
Q10. You can't plagiarise yourself	.11	-.13	.53	.05
Q11. If I lend a paper to a student to look at who plagiarises, I should not be punished also	.08	-.06	.86	-.05
Q12. Plagiarists should receive a special grade for cheating, which would deter them	.18	-.01	-.31	.24

Note. Pattern matrix data can be interpreted as regression coefficients, such that those with a factor loading > .4 (bolded) are considered to load well on the factor.

Table 4
Fit of the Plagiarism Attitude Scale after removal of misfitting items

Item	Location	Fit residuals	χ^2	<i>p</i>	<i>F</i>	<i>p</i>
Q1 Sometimes I feel tempted to plagiarise	0.84	1.02	2.86	0.58	0.59	0.67
Q2 I know what plagiarism is	0.07	0.34	1.13	0.89	0.26	0.90
Q3 Plagiarism is as bad as stealing an exam	0.89	0.00	1.52	0.82	0.44	0.78
Q4 Using others' work with their permission is ok	0.57	0.14	7.44	0.11	2.25	0.07
Q6 Punishment for plagiarism should be light	-0.18	0.60	1.78	0.78	0.47	0.76
Q9 Plagiarism involves taking others' words, not property, so it's no big deal	1.45	-0.96	9.26	0.05	3.31	0.01
Q10 You can't plagiarise yourself	-1.63	0.70	2.39	0.67	0.52	0.72
Q11 If I lend a paper to a student to look at who plagiarises, I should not be punished also	-2.01	-0.23	4.25	0.37	1.31	0.27

Note. Items with fit residuals <-2.5 and > 2.5 are considered misfitting. Bonferroni adjusted *p* values are significant at $p < .006 (.05/8)$.