

Measuring psychological distress in New Zealand: Item response properties and demographic differences in the Kessler-6 screening measure

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The Kessler-6 (K6) is a six-item self-report measure of non-specific psychological distress designed for use in population health screening surveys. This study documents item response parameters and ethnic group differences in the K6 among a sample of New Zealand adults (N = 4401). We also compare results based on item response-weighting and classical summative scoring procedures. Analyses based on Item Response Theory indicated that the K6 had good measurement precision in the New Zealand population. In terms of ethnic group differences, Pacific and Asian peoples exhibited the highest levels of psychological distress across both scoring methods (12.3% of Pacific peoples and 9.9% of Asian peoples scored in the K6 range indicative of serious psychological distress), whereas Māori and Pākehā/European peoples showed (relatively) lower levels of psychological distress (7.2% of Māori and 4.7% of Pākehā/Europeans). Older people, parents, and those who were in a committed relationship, employed, and more affluent people had lower levels of psychological distress compared to their respective counterparts. Nevertheless, the high level of psychological distress experienced by Asian peoples held when adjusting for these (and other) demographic characteristics. The need for further research and policy-wide interventions addressing the disparity in psychological health outcomes experienced by different ethnic groups in New Zealand is discussed.

Keywords: Item Response Theory, national probability sample, New Zealand, psychological distress, ethnicity, depression, anxiety.

From the early 1980s, the standard practice for measuring psychopathology in a population was through fully structured diagnostic interviews conducted in epidemiological surveys (Kessler et al., 2002). With the use of such interviews, community and nationally representative surveys have provided important prevalence rates for the number of people in the general population who meet the Diagnostic and Statistical Manual's (fourth edition; DSM-IV) criteria for having one or more psychiatric illnesses in their lifetime, while also highlighting the general prevalence rates of psychological distress at any given point in time

(Kessler et al., 2002). However, the use of fully structured diagnostic interviews in nationally representative samples is highly complex and time consuming (Pinninti, Madison, Musser, & Rissmiller, 2003; Oakley Browne, Wells, Scott, & McGee, 2010; Mitchell & Beals, 2011). Consequently, short screening scales that are cheaper to administer, and less burdensome for participants, have been developed to complement these fully structured diagnostic interviews.

Here, we assess the item response properties for the Kessler-6 (K6), a short screening measure of non-specific psychological distress, in

a large New Zealand sample. We compare demographic differences in psychological distress using indicators based on item response-weighted K6 scores and classical summative item scores, and discuss the utility of these different scoring methods for the assessment of psychological distress in New Zealand. Finally, we present an in-depth analysis of ethnic group (and other demographic-based) differences in psychological distress.

The Kessler scales, which consist of 6-item and 10-item scales, have been successfully used in a range of population and community surveys around the world (Kessler, Green, Gruber, Sampson, Bromet, Cuitan, et al., 2010; Sunderland, Slade, Stewart, & Andrews, 2011). Here in New Zealand, the Kessler scales have been introduced into the 2006/07 and 2011/12 New Zealand Health Survey (NZHS; Ministry of Health, 2007, 2012) and the 2003/04 New Zealand Mental Health Survey (NZMHS; Mental Health Commission, 2011). We aim to complement these earlier analyses using data from another large—and independent—national sample conducted in New Zealand: The New Zealand Attitudes and Values Study (NZAVS). Using NZAVS data, we examine the item response properties of the K6. Building on the original analyses of North American data by Kessler et al. (2002), we employ Item Response Theory (IRT) to examine the scale's ability to differentiate between people with low/no psychological distress versus people with mild psychological distress, or between people with mild/

moderate distress versus more extreme levels of distress in the unique context of New Zealand.

We also provide up-to-date population norms for rates of non-specific psychological distress in New Zealand, with particular focus on differences in prevalence rates between ethnic groups. New Zealand has a highly diverse ethnic population (Sibley & Ward, in press). According to the 2006 census, New Zealanders of European descent compose 67% of the population, Māori 15%, Asians 9% and Pacific peoples 7% (Statistics New Zealand, 2006). Moreover, differences in mental health and psychological distress among Māori, Pacific and European peoples are well documented (e.g., see Harris et al., 2012). We present additional data from 2010 that contribute to this research corpus on demographic differences in mental health.

The Kessler scales

The development of the Kessler scales was based on a review of psychopathological screening scales by Dohrenwend, Shrout, Egri, and Mendelsohn (1980). The scales constitute the first population health screening tools developed using modern IRT (Kessler et al., 2002). Kessler and colleagues (2002) used IRT to select items for their scales which had maximum precision in the clinical range of the latent trait (θ) for non-specific psychological distress. Because between 6 to 10 percent of the US population are estimated to meet the diagnostic criteria for a serious psychiatric illness in a given year (Kessler, Berglund, Zhao, Leaf, Kouzis, Bruce, et al., 1996), the Kessler scales were developed to be optimally precise at the 90-99th percentile of the general population (i.e., the range at which psychological distress is most critical to detect and differentiate from the remainder of the population; Kessler et al., 2002, 2010; Kessler, Barker, Colpe, Epstein, Gfroerer, Hiripi, Howes, et al., 2003). Moreover, space constraints on standard epidemiological surveys required the use of short scales (Kessler et al., 2002; 2010). As a result, 6-item and 10-item scale versions were created, which are now referred to as the K6 and K10, respectively (Kessler et al., 2002). The

Table 1.

Items of the Kessler-6 (K6) Non-Specific Psychological Distress Scales.

During the last 30 days, how often did...

- ... you feel nervous
- ... you feel hopeless?
- ... you feel restless or fidgety?
- ... you feel so depressed that nothing could cheer you up?
- ... you feel that everything was an effort?
- ... you feel worthless?

items included in the K6 are presented in Table 1.

Item Response Theory (IRT)

IRT provides information that is quite distinct from that provided by classical test theory (see van der Linden & Hambleton, 1997). For example, in classical test theory, Cronbach's alpha provides information on how well the items in a scale 'hang together' or inter-correlate. IRT, in contrast, provides information about relative levels of measurement precision across different ranges of the latent trait being measured (see Hambleton & Jones, 1993, for discussion). Unlike analyses based on classical measurement models (e.g., Cronbach's alpha, EFA, CFA), IRT can be used to determine the extent to which a scale reliably differentiates between people at different levels of a latent trait. Put another way, IRT provides information on how reliable a scale is for measuring people depending upon their levels of the trait being measured. The application of IRT we employ here models scale reliability using two types of parameters: item discrimination and item difficulty.

In IRT, an item's ability to differentiate between people is modelled as being most precise at trait ranges corresponding to the item difficulty parameter. For example, imagine we have two items, one with a discrimination parameter of 1.0 and a difficulty of -1.0, the other also with a discrimination parameter of 1.0, but a difficulty parameter of 1.0. Both items are equally able to differentiate between individuals, but at different regions of the trait range. Item difficulty parameters in an IRT model reflect the level of the trait that a person would need in order

to have a 1 in 2 (50%) chance of scoring in the positive direction on the item. For example, a person with the sample mean level of a trait ($\theta = 0$) would have a 50% chance of scoring in the positive (high trait) direction on an item with a difficulty value of 0. Similarly, a person with a trait level one standard deviation above the mean ($\theta = 1$), would have a 50% chance of scoring in the positive (high trait) direction on an item with a difficulty value of 1.

Item discrimination and item difficulty are used to determine the Test Information Function for the scale. This function provides an index of the level of precision, or information provided by the scale, across different levels of the trait being measured. The desired shape of the Test Information Function depends upon the theoretical nature and expected prevalence of the trait in the population. For instance, in educational assessment, the ideal may be to develop a test that provides a high level of information across all levels of the trait range (e.g., +/- 2 standard deviations from the mean). As such, we would hope that the response distribution of a 'good' test in this area would be relatively high and flat rather than bell-shaped. This is also the typical function for the Mini-IPIP6 Big-Six measure of personality in New Zealand (Sibley, 2012) and the Group Membership Evaluation subscale of Houkamau and Sibley's (2010) Multidimensional Model of Māori Identity and Cultural Engagement (Sibley & Houkamau, 2013).

In contrast, the Test Information Function for a clinical measure of mental health (or psychological distress) should look quite different in a general population sample. Within this context, we would expect that

the Test Information Function should be skewed toward high values of θ , say for example, $\theta > 1.0$ (keeping in mind that 1.0 represents 1 Standard Deviation). This is exactly the type of function for which the items on the K6 were originally selected (Kessler et al., 2002). Because the K6 items have high difficulty and high discrimination parameters (Kessler et al., 2002), the Test Information Function for the K6 is represented by a steep function with a peak skewed toward higher levels of the latent trait distribution. A function of this type indicates that the test provides detailed information that differentiates between people with high versus very high levels of the trait in question, but does not differentiate that well between people with low or moderate scores. The K6 was explicitly developed in this manner so that it would provide a precise estimate of graduations in the level of psychological distress among people who are at the greatest risk of being diagnosed with a serious mental illness.

The New Zealand context

Based on the extensive use of the Kessler scales and their noted success in discriminating between clinical versus non-clinical levels of psychological distress in community samples globally (Kessler et al., 2010; Sunderland et al., 2011), the 2006/07 and 2011/2012 NZHS and the 2003/04 NZMHS adopted the K10 scale. These New Zealand-based national surveys have provided population norms for rates of non-specific psychological distress across various socio-demographic correlates including ethnicity and socioeconomic status (Mental Health Commission, 2011; Oakley Browne et al., 2010).

The 2006/2007 NZHS found that Pacific Nations peoples were most at risk of having (or developing) an anxiety disorder or depression (12.9%), followed by Māori (10.8%), Asian (7.7%), and European/Other (6.1%; Mental Health Commission, 2012). Results from the 2003/04 NZMHS found a similar pattern of results, with Pacific Nations peoples being more at risk of an anxiety disorder or depression (4.2%), followed by Māori (3.4%; Oakley Browne et al., 2010). Though the ranking of ethnic group differences were comparable across the

two 2006/07 and 2003/04 studies, the absolute number of people belonging to the respective groups who were likely to qualify for a clinical diagnosis differed considerably. Whereas 12.9% of Pacific Nations peoples had a high (or very high) likelihood of qualifying for a DSM-IV disorder in 2006/2007, the 2003/2004 study indicated that the respective percentage was notably lower (i.e., 4.2%). Similar large discrepancies across the two study years are seen for Māori (i.e., 10.8% versus 3.4%) and European/Other (i.e., 6.1% versus 2.6%). This may reflect a change in rates of mental health in these populations across time, possibly as other factors such as poverty or economic deprivation have been changing differentially across time for these groups.

Socio-economic status is also a well-established factor influencing mental health (Read 2004, 2010). Results from both the 2003/04 NZMHS and the 2006/07 NZHS found a significant relationship between living in higher deprivation areas and having higher levels of psychological distress (Mental Health Commission, 2011; Oakley Browne et al., 2010). It also seems likely that differences between ethnic groups in mental health may be partly due to differences in socio-economic status (Read, 2004). However, socio-economic status cannot entirely explain the differences in mental health consistently observed across ethnic groups in New Zealand. The 2003/04 NZMHS and the 2006/07 NZHS found that ethnic group differences in non-specific psychological distress remained significant after statistically adjusting for socioeconomic factors (Oakley Browne et al., 2010).

Research on multicultural attitudes in New Zealand may shed light on why minority groups, such as Pacific Nations peoples, consistently show an increased risk of anxiety and depression even after controlling for socio-economic status. One contributing factor may be experiences of discrimination (Harris, Tobias, Jeffreys, Waldegrave, Karlsen, & Nazroo, 2006). Indeed, Sibley and Ward (in press) reported that Asian and Pacific peoples expressed higher expectations of race-based rejection than other ethnic groups, which other research indicates may in turn be

associated with poor mental health (Harris et al. 2006; Gee, Spencer, Chen, Yip, & Takeuchi, 2007).

Overview of the present study

Previous research has demonstrated the ability of the Kessler scales to efficiently detect those in the population who are at risk of psychiatric illness (Kessler et al., 2002), identify the severity of the illness (Mitchell & Beals, 2011), and outperform other screening measures such as the GHQ-12 (Furukawa, Kessler, Slade, & Andrews, 2003). Due to the scale's short form, robustness, and ability to perform as well as the K10, Kessler and colleagues (2010) recommended using the K6 scale over the K10. Here, we follow this recommendation and assess the psychometric properties and demographic differences in the K6 across different scoring methods. In doing so, we also document the item response properties for the K6 among a large and nationally representative sample of New Zealand adults. The parameters derived using IRT also allow us to construct weighted scale scores that maximize test information across the trait range.

In research using a classical scoring approach to the K6, item scores are summed to give the final score for a respondent. This can range 0 to 24 for the K6 (six items, each with a range from 0-4), with a higher score indicating higher levels of psychological distress (Kessler et al., 2010; Mitchell & Beals, 2011; Oakley Browne et al., 2010; Cairney, Veldhuizen, Wade, Kurdyak, & Streiner, 2007). We refer to this as summative scoring, which is identical to creating scale means, as the scale mean is a linear transformation of the item sums. A second, widely used, method for scoring the K6 is to trichotomize K6 sum scores into three 'scale bands.' In this categorization-based approach, respondents are categorized as being 'low' (K6 scores from 0-7, 'mild/moderate' (K6 scores from 8-12), and 'high' (K6 scores of 13 and above) in their level of non-specific psychological distress (Kessler et al., 2003; Wang, Gruber, Powers, Schoenbaum, Speier, Wells, & Kessler, 2007). This categorization-type approach has been

used extensively in the literature, despite the fact that the K6 was explicitly developed using IRT-weighting to maximize measurement precision.

Do studies that use categorization-based or summative scoring procedures of the K6 risk missing important variations across people? If so, to what degree may this occur? To address these questions, we compare and contrast the technical IRT-weighted approach with the traditional and (easily implemented) summative scoring approach. Although IRT-weighted scoring will provide more precise estimates, the magnitude of the difference between these two approaches needs to be assessed. Specifically, one must ask whether both methods provide comparable results, or if there are dramatic differences in the conclusions drawn across methods. We also provide a general regression equation allowing researchers to predict K6 scores from the additive combination of various socio-demographic variables including age, gender, deprivation, religion, and employment. In addition, we provide IRT-weighted K6 scores for each of the four main ethnic groups in New Zealand. Normative data are vital for monitoring the mental health of individuals and groups in New Zealand, as well as any trends that may emerge over time (Slade, Grove, & Burgess, 2011).

Extant research indicates that Pacific Nations peoples have the highest levels of non-specific psychological distress in both the 2006/07 NZHS and the 2003/04 NZMHS (Mental Health Commission, 2011, 2012; Oakley Browne et al., 2010). These findings are also consistent with research showing that Pacific peoples are amongst the highest in their levels of race-based rejection expectations, which are believed to reflect real-life experiences of discrimination (Sibley & Ward, in press). Because experiences of discrimination are strongly associated with poor mental health (Harris et al., 2006), we predicted that Pacific Nations peoples would report higher levels of non-specific psychological distress than Māori or European/Pākehā peoples. Moreover, given the size of the discrepancy in prevalence rates of mental health issues between ethnic groups, we expected that this distinction would hold across K6 scoring methods.

Data from the NZHS 2006/07, by

contrast, indicate that Māori peoples sit somewhere in between Pacific and Europeans/Pākehā in their rates of psychological distress. As noted above, according to the NZHS 2006/07, a higher proportion of Māori peoples (10.8%) were at risk of depression of an anxiety disorder relative to Europeans/Pākehā (6.1%), but were at a lower risk than Pacific peoples (12.9%; Mental Health Commission, 2012). The difference between Māori and Pākehā/European peoples is also consistent with research assessing differences between these two ethnic groups in other more general domains of subjective wellbeing, including ratings of subjective standard of living, overall health, and expectations of future security (Sibley, Harré, Hoverd, & Houkamau, 2011). We expected to observe a similar disparity between Pākehā/Europeans and Māori in K6 scores across different K6 scoring methods. We also expected that, while Māori would have higher levels of psychological distress than Pākehā/Europeans, both of these ethnic groups should report lower levels of psychological distress than Pacific (and possibly Asian) peoples.

There is a marked lacuna of research assessing the mental health of Asian peoples in New Zealand (Ho, Au, Bedford & Cooper, 2003). Available data from the 2006/07 NZHS indicated that Asian peoples had lower levels of psychological distress relative to Pacific and Māori peoples. According to the 2006/07 NZHS, 7.7% of Asian peoples had a K10 score of 12 or more (indicating a high probability of an anxiety or depressive disorder)—lower than the figures reported for both Māori and Pacific peoples (Mental Health Commission, 2012). Interestingly, however, other data indicate that Asian peoples report expectations about race-based rejection at rates that are comparable to Pacific Nations peoples—which tend to be higher than both Māori and Europeans/Pākehā (Sibley & Ward, in press). Current levels of psychological distress among Asian peoples would thus seem to be somewhat of an open question, especially when psychological distress is assessed using IRT-weighted K6 or K10 scores, rather than more simple scoring methods that examine the proportion of people falling within

different scale bands.

Method

Sample details

The present study analysed data from the 2010 New Zealand Attitudes and Values Study (NZAVS). This is the second wave of a longitudinal national probability sample conducted in New Zealand. The 2010 NZAVS contained responses from 4,442 participants. We limited our analyses to the 4401 participants who responded either partially, or completely, to the K6 items (missing K6 item responses were estimated in our IRT analysis using Full Information Maximum Likelihood). Note that sample sizes also differed by ~100 cases across demographic analyses due to missing data among the exogenous demographic variables.

The sample analyzed here contained 2,709 women and 1,692 men, with a mean age of 50.93 years ($SD = 15.21$). In terms of ethnicity, 15.5% of the sample identified as Māori ($n = 683$), 3.7% indicated they had Pacific Nations ancestry ($n = 162$), 4.0% were of Asian ancestry ($n = 178$), 85.9% identified as European ($n = 3780$), and 3% identified with another ethnic group ($n = 130$). Note that these percentages do not sum to 100% as some people identified with multiple ethnic groups and were thus counted in multiple categories. For ANOVA and chi-square analyses requiring independent cells, we adopted a priority coding scheme in the following classification order: Māori, Pacific, Asian, European/Other (note that results were comparable in our regression analyses allowing multi-ethnic group memberships).

With regard to other demographic covariates, 71.2% ($n = 3,134$) of participants were in a romantic relationship or married; 77.6% ($n = 3,415$) were parents; 71.1% ($n = 3,130$) of participants were in full or part-time employment; 42.9% ($n = 1,890$) were religious; and 78.3% ($n = 3,445$) of participants were born in New Zealand.

Measures

Psychological distress was measured using the K6 scale developed by Kessler et al. (2002). Participants were asked to rate the K6 items for the last 30 days, using the instruction set:

‘During the last 30 days, how often did...’ Items were rated using the following scale: 0 (none of the time), 1 (a little of the time), 2 (some of the time), 3 (most of the time), and 4 (all of the time). The items of the K6 scale are presented in Table 1.

The regional deprivation of each participant’s immediate neighborhood was indexed using the NZDep2006 (White, Gunston, Salmond, Atkinson, & Crampton, 2008). To index affluence versus deprivation of participants’ local neighborhood, we matched participants’ location with census information on the immediate local area (meshblock unit) in which each participant resided. New Zealand has a population of roughly 4 million. Statistics New Zealand divides the country into 41,392 meshblock area units. The geographical size of these units differs depending on population density, with each unit covering a region that contains roughly 100 residents ($M = 103$, $SD = 72$, range = 3–1,431). We capitalized on the detailed information available from the New Zealand census on the characteristics of each area unit, including the relative level of deprivation versus affluence of each area (based on the average income of residents along with other factors). The NZDep2006 gives a decile-ranked deprivation score to each meshblock based on a Principal Components Analysis of nine variables using census data of people living in that specific area. These are (in weighted order): proportion of adults receiving a means-tested benefit, household income, proportion not owning their own home, proportion of single-parent families, proportion unemployed, proportion lacking qualifications, proportion of household crowding, proportion with no

telephone access, and proportion with no car access. The mean NZDep2006 score in our sample was 4.92 ($SD = 2.81$; range 1-10).

Results

Item Response Properties of the K6

We conducted a graded item response analysis examining response parameters for the six K6 items. The mathematical procedures behind a graded item response model of the type employed here can be summarized as follows:

$$P_j(\theta_i) = 1 / (1 + \exp(-\alpha_j(\theta_i - \beta_j))) \tag{1.0}$$

This equation states that the probability that a given individual (j) with a given level of trait θ will have a level of that trait is defined by one aspect of the person (their true trait level) and two aspects of the way it is measured (or item parameters). These two parameters are item difficulty (β_j) and item discrimination (α_j). In this model, trait levels can be thought of as reflecting a standardized (z-scored) range, with a mean of 0 and standard deviation of 1. Item difficulty parameters ($\beta_1 - \beta_4$) representing each set of ordered contrasts between different response options on the 5-point rating scale are defined as follows:

$$\begin{aligned} \beta_1 &= 0 \text{ v } 1234 \\ \beta_2 &= 01 \text{ v } 234 \\ \beta_3 &= 012 \text{ v } 34 \\ \beta_4 &= 0123 \text{ v } 4 \end{aligned} \tag{2.0}$$

Discrimination (α) and difficulty ($\beta_1, \beta_2, \beta_3, \beta_4$) parameters for each

K6 item are shown in Table 2. As reported, difficulty parameters for the K6 items were all positively skewed, indicating that the items could generally be considered ‘difficult’ to agree with for people with a low level of psychological distress. The difficulty parameters were also reasonably spread across values between the 0.0 to 3.0 range. This suggests a reasonable spread of item difficulty across the moderate-to-high level of the trait range.

We integrated the difficulty and discrimination parameters to derive a Test Information Function for K6, where α_j^2 is the squared item discrimination parameter for the j th item, and $P_j(\theta_i)$ is the probability of endorsing item j for individuals with a given (i) level of trait θ :

$$I_j(\theta) = \alpha_j^2 \times P_j(\theta_i) \times (1 - P_j(\theta_i)) \tag{3.0}$$

The Test Information Function (TIF) for the full K6 scale is displayed in Figure 1. We graphed this function for values of θ ranging from -3.0 to 3.0 standard deviations. As shown, the K6 provided the most precise information about latent psychological distress for θ ranging from 0.0 to 1.0. These results are comparable to those produced in the original paper by Kessler et al. (2002), which suggests that the K6 works similarly in the New Zealand context (i.e., the scale is able to discriminate between respondents in the moderate-to-high range of the distribution for psychological distress).

Comparison of IRT-weighted and classical sum scoring

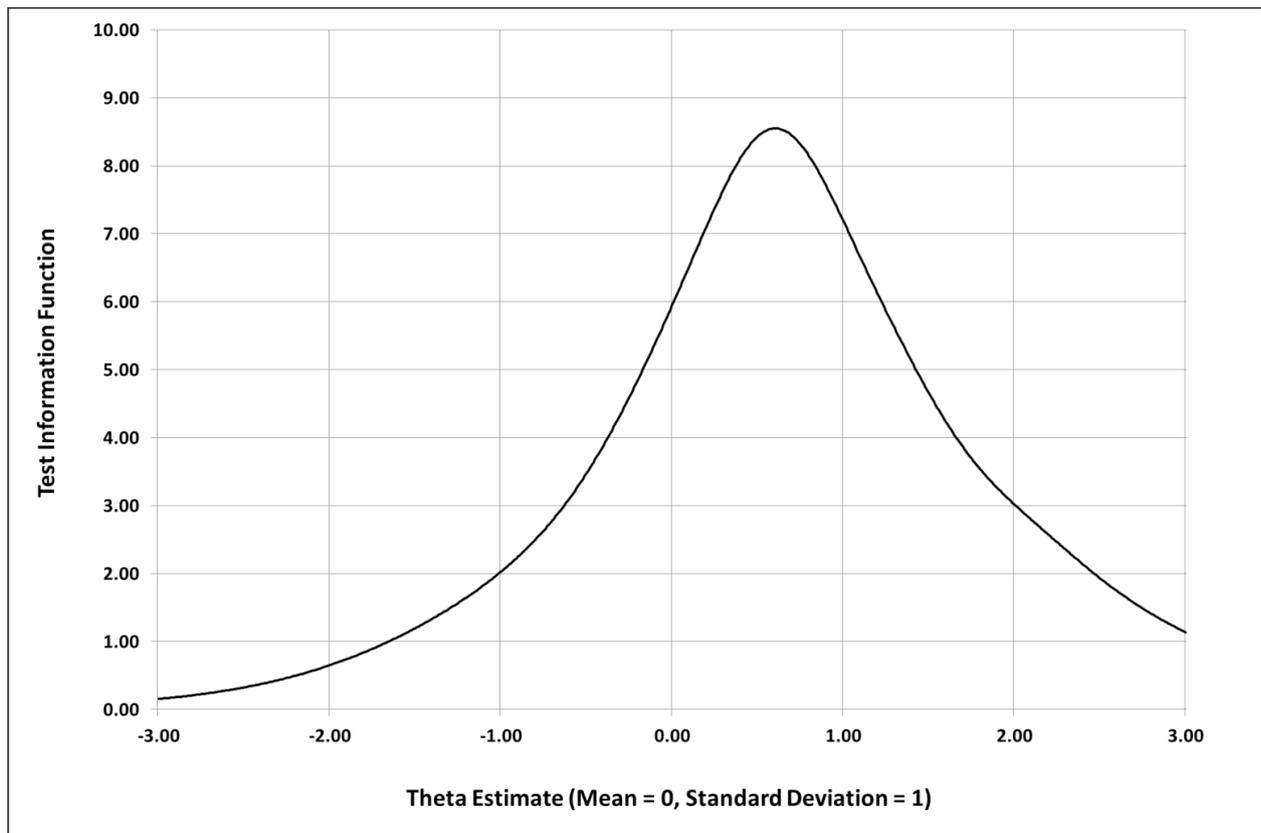
In addition to providing information about the measurement precision of the K6 in New Zealand, the IRT parameters

Table 2. Discrimination (α) and Difficulty ($\beta_1, \beta_2, \beta_3, \beta_4$) Parameter Estimates for the Kessler-6 in New Zealand.

	Item Response Parameters				
	α	β_1	β_2	β_3	β_4
you feel hopeless?	1.71	-0.01	0.97	2.14	3.11
you feel so depressed that nothing could cheer you up?	1.70	0.57	1.34	2.24	3.22
you feel restless or fidgety?	0.89	-0.89	0.54	2.10	3.70
you feel that everything was an effort?	1.04	-0.81	0.59	1.78	3.06
you feel worthless?	2.09	0.60	1.33	2.04	2.83
you feel nervous?	0.88	-0.59	0.83	2.34	3.74

Figure 1.

Test information function for the K6 scale in New Zealand.



allow for the construction of weighted scale scores. These scores weight responses based on their difficulty and discrimination parameters, therefore providing more precise information about individual differences across the population relative to procedures using classical summative (or mean) scoring approaches.

To assess the differences and similarities between classical (i.e., mean) and IRT-weighted scoring methods for the K6, we correlated scale scores derived from these two approaches. A scatter plot of K6 scores estimated using these two methods is presented in Figure 2. We plotted both linear and curvilinear (quadratic) lines of best fit for the association between these two scoring methods. This figure clearly shows that the summative scoring method tended to diverge (as indicated by the departures from the linear line of best fit) from IRT-weighted scores at *high levels* of the latent trait (that is for high levels of psychological distress). Nevertheless, the linear association between K6 sum scores and K6 IRT-weighted scores had $R^2 = .931$. Modelling the curvilinear

association provided a slight increase in model fit, with $R^2 = .958$. Overall, these results indicate that item sum and IRT-weighted K6 scoring procedures yielded highly similar results for the majority of the population. There was, nevertheless, variation in scores depending upon the scoring method. Moreover, the residuals between predicted and observed K6 IRT-weighted scores were most pronounced for higher scores indicative of greater psychological distress. As expected, it is at the high end of the trait range where an IRT-weighted scoring method should be of most utility in providing more precise estimates relative to simple summative scores.

Ethnic group differences in psychological distress

We examined ethnic group differences in psychological distress across three scoring methods by examining (a) the proportion of different ethnic groups classified in the different K6 sum ranges proposed by Kessler et al. (2003), (b) mean differences in K6 item sum scores, and (c) mean differences across ethnic groups in IRT-weighted K6 scale scores. An analysis of

the proportion of people falling into each K6 sum range is arguably the simpler (and easier to implement) approach relative to the computationally-intensive IRT-weighted scores approach.

Ethnic group differences in the proportion of people classified within each K6 category of psychological distress are reported in Table 4. This classification system is based on the validation study by Kessler et al. (2003) and follows the scoring procedure employed in the NZHS surveys. Following this procedure, a K6 sum score from 0-7 was defined as representing 'No Psychological Distress', whereas a score from 8-12 was defined as indicating 'Mild/Moderate Psychological Distress.' Finally, 'Serious Psychological Distress', was indicated by scores from 13-24.

Consistent with our predictions, a chi-square difference test indicated that there were significant differences between ethnic groups across these three K6 categories ($\chi^2(6, n = 4300) = 44.14, p < .001$). Specifically, results indicated that 9.9% of Asian peoples and 12.3% of Pacific peoples scored

Figure 2.

Linear and polynomial lines of best fit for the association between K6 classical sum scores and IRT-weighted scores.

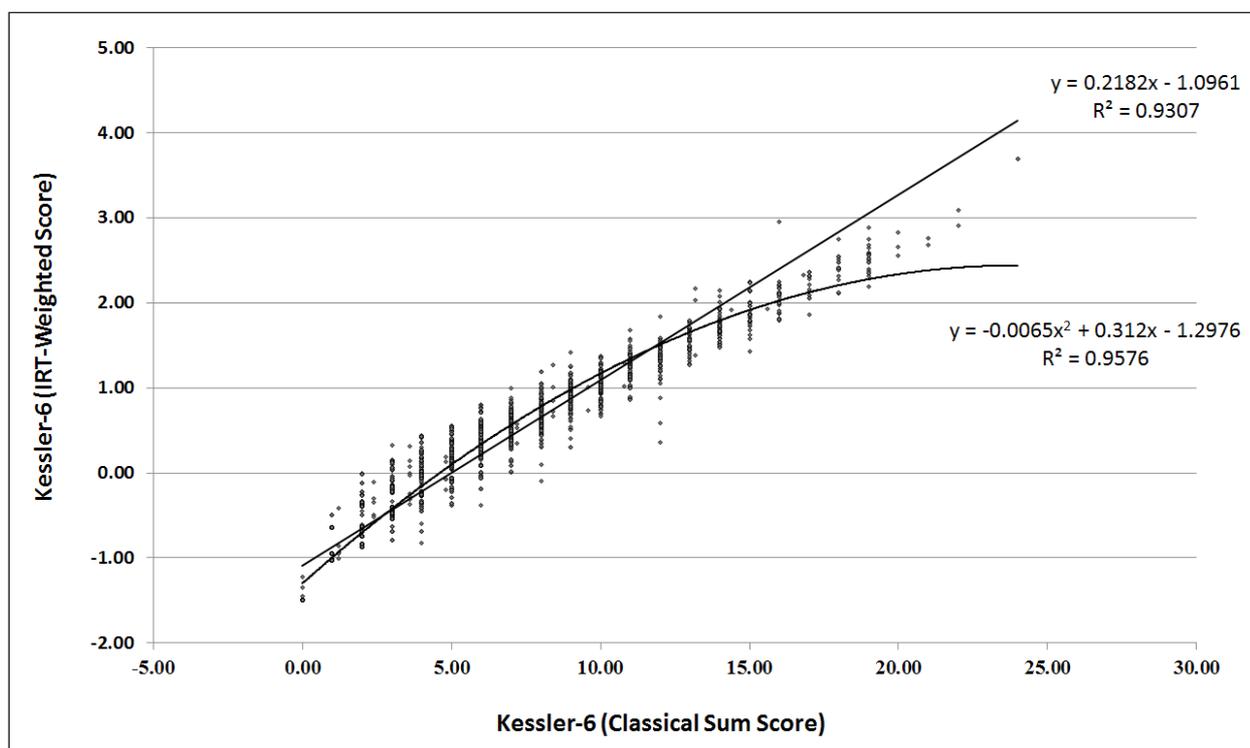


Table 3.

Percentages for Low, Mild/Moderate, and Severe Non-Specific Psychological Distress (K6) Categories for NZ European/Pākehā, Māori, Pacific Nations and Asian Peoples in New Zealand.

	Ethnicity				
	NZ European/ Pākehā	Māori	Pacific Nations	Asians	Total
No psychological distress (score 0-7)	79.0% (n = 2630)	74.0% (n = 505)	63.0% (n = 87)	67.3% (n = 109)	77.5% (n = 3331)
Mild/Moderate psychological distress (score 8-12)	16.1% (n = 533)	18.8% (n = 128)	24.6% (n = 34)	22.8% (n = 37)	17.0% (n = 732)
Serious psychological distress (score 13-24)	4.7% (n = 155)	7.2% (n = 49)	12.3% (n = 17)	9.9% (n = 16)	5.5% (n = 237)
Total	100.0% (n = 3318)	100.0% (n = 682)	100.0% (n = 138)	100.0% (n = 162)	100.0% (n = 4300)

Table 4.

Raw and Covariate-Adjusted IRT Mean Scores of Non-Specific Psychological Distress for NZ European/Pākehā, Māori, Pacific Nations and Asian Peoples in a New Zealand National Probability Sample.

	Raw parameters		Covariate-adjusted Parameters	
	<i>M</i>	<i>SE</i>	<i>M</i> _(adj.)	<i>SE</i> _(adj.)
NZ European/Pākehā	-.055	.016	-.019	.017
Māori	.095	.035	-.009	.038
Pacific Nations	.382	.077	.121	.085
Asians	.308	.071	.272	.081

Covariates were mean centered to estimate adjusted parameters.

in the K6 range indicative of serious psychological distress. In contrast, 7.2% of Māori and 4.7% of Pākehā/European peoples were classified within the serious psychological distress range. These results, which are based on data from 2010, are broadly consistent with the 2006/2007 NZHS, yet they notably differ from the earlier 2003/2004 NZMHS.

We also examined ethnic group differences in mean K6 scores using both a summative approach and an IRT-weighted approach. This complemented the prior analysis of proportional differences in K6 category scores and allowed us to estimate adjusted mean levels of psychological distress after controlling for demographic covariates.

As expected, there was a significant difference in psychological distress between ethnic groups when estimated using classical (summative) K6 scores ($F(3,4299) = 22.62, p < .001, \text{partial } \eta^2 = .016$). This difference between ethnic groups also held when psychological distress was estimated using IRT-weighted K6 scores ($F(3,4299) = 20.81, p < .001, \text{partial } \eta^2 = .014$). Moreover, analyses of specific ethnic group differences were comparable across both scoring methods. As such we focus on IRT-weighted estimates below.

IRT-weighted K6 scores for Asian, Pacific, Māori and Pākehā/European peoples are presented in Figure 3; the corresponding mean values are reported in Table 4. As indicated in Figure 3, Bonferroni-corrected post-hoc tests indicated that Asian and Pacific Nations peoples reported similar (and relatively high) levels of non-

specific psychological distress ($p > .99$). Moreover, Asian and Pacific people both reported significantly higher levels of generalized psychological distress than Europeans/Pākehā ($ps < .001$, respectively) and Māori ($p < .040, p < .004$, respectively). Finally, though Māori reported lower levels of non-specific psychological distress relative to Asian and Pacific Nations peoples, they nevertheless experienced significantly higher levels of distress than NZ Europeans/Pākehā ($p < .001$).

To garner a purer estimate of ethnic group differences in levels of non-specific psychological distress, we examined whether these ethnic group differences held when statistically adjusting for variation across groups in age, age squared, the sample proportion of men and women, immigrant status, level of deprivation, religious affiliation, parental status, relationship status, and employment. Covariate-adjusted IRT-weighted K6 scores are presented in Figure 3 (and documented in Table 4). The ANCOVA examining ethnic group differences in IRT-weighted scores with these demographic covariates included in the model was significant ($F(3,3643) = 4.60, p = .003, \text{partial } \eta^2 = .004$). A comparable ANCOVA examining K6 summed scores yielded similar results ($F(3,3643) = 5.50, p = .001, \text{partial } \eta^2 = .005$).

As indicated in Figure 3, the high level of psychological distress experienced by Asian peoples in New Zealand relative to other ethnic groups was *more* pronounced after adjusting for other (potentially confounding) demographic factors. When adjusting for demographics, Bonferroni-corrected

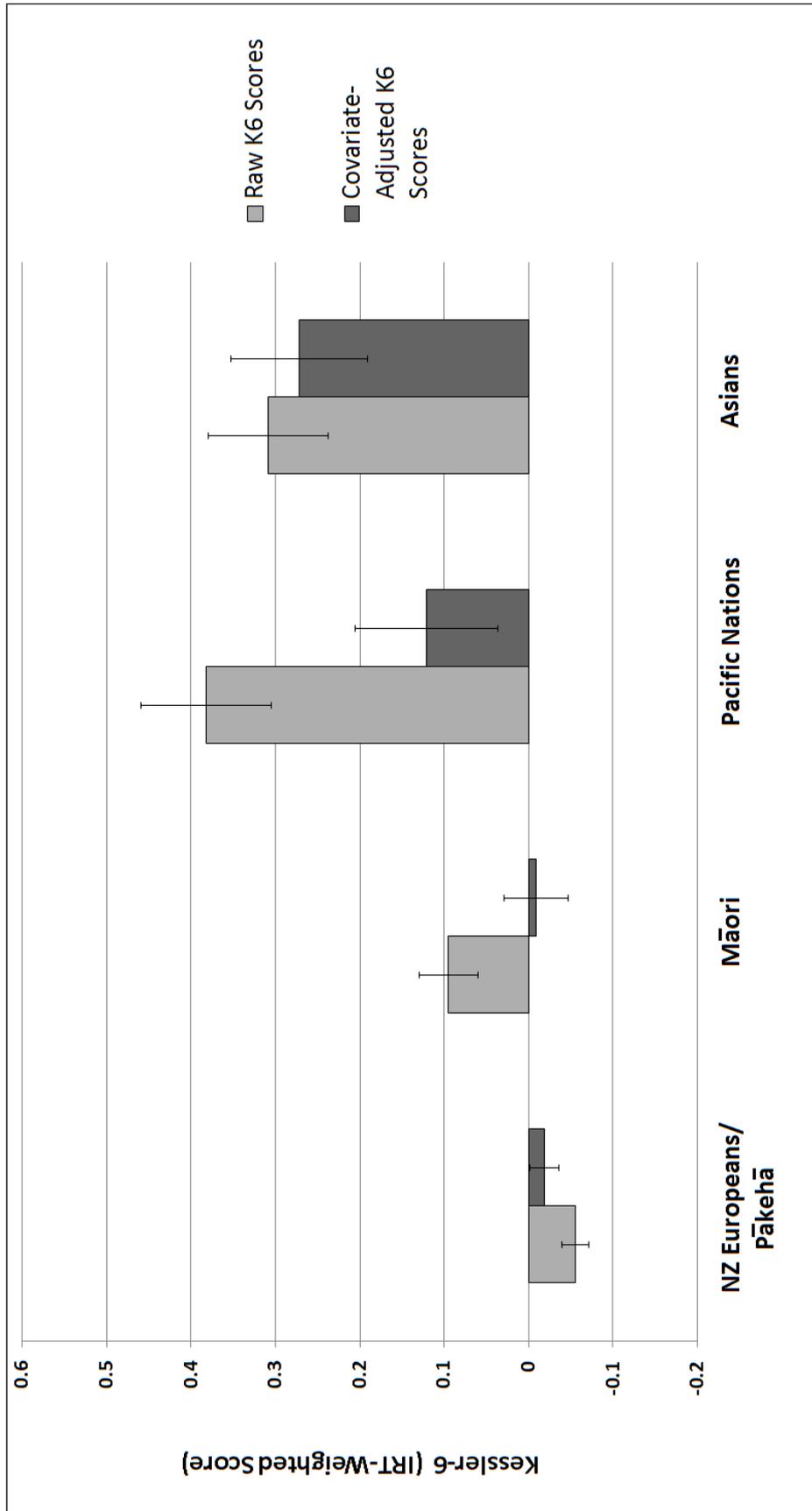
post-hoc tests indicated that Asian peoples retained significantly higher levels of psychological distress relative to Pākehā/European ($p = .003$) and Māori ($p = .013$). However, Asian and Pacific people reported similar levels of psychological distress ($p = > .99$). Moreover, Pākehā/European, Māori, and Pacific people also did not differ significantly in covariate-adjusted levels of psychological distress ($ps > .65$). These findings indicate that any apparent difference between Pākehā/European, Māori, and Pacific people in their level of psychological distress is most likely due to other demographic factors that tend to covary with ethnicity, such as differences in material deprivation and employment status.

Critically, however, the heightened level of psychological distress experienced by Asian peoples relative to other ethnic groups cannot be entirely accounted for by other demographic factors—Asian peoples remain higher than other groups in their level of psychological distress when adjusting for effects due to poverty, employment, and a myriad of other demographics.

A Demographic Model of Psychological Distress

Many of the demographic covariates we included in our earlier analyses were significant in their own right when predicting K6 scores. We thus report a full regression model of the independent effects of the demographic factors on psychological distress. For completeness, we report this regression model for both IRT-weighted K6 scores, and classical (summative) K6 scores (see Table 5). The regression model

Figure 3. Raw and covariate-adjusted scores for the IRT-weighted K6 for NZ European/Pākehā, Māori, Pacific Nations and Asian peoples in New Zealand. Error bars represent the standard error of the mean. (Covariate-adjusted scores statistically adjusted for various demographic factors, as outlined in Table 5).



included the linear and quadratic effects of age, gender, immigrant status, religion, parental status, relationship status, employment status, and level of regional deprivation (indexed using the NZDep). Ethnicity was represented in the model using a series of three dummy codes reflecting Māori, Pacific and Asian ethnic affiliation (the constant thus represented predicted scores when all predictors were 0, or the predicted score for Europeans/Other).

Our regression model yielded comparable results when psychological distress was estimated using IRT-weighted versus classical sum scoring methods. Both models were significant, and explained around 8-9% of the variance ($R^2 = .080$, $F(12,3715) = 27.06$, $p < .001$; and $R^2 = .086$, $F(12,3715) = 29.30$, $p < .001$, respectively). As shown in Table 5, older people reported less psychological distress. Deprivation was also strongly linked with higher levels of psychological distress. Parents, those in a romantic or marital relationship, and those who were employed all showed lower levels of psychological distress. Religious affiliation, immigrant status, and gender were not significantly linked with psychological distress. Finally, and consistent with our earlier analysis of ethnic group differences, Asian peoples reported higher levels of psychological distress relative to the contrast category reflecting European/Other ethnic groups, whereas Māori and Pacific people did not.

Finally, we conducted additional regression models assessing the effect of immigrant status separately for Asian and Pacific participants. These regression models examined the effect of immigrant status on IRT-weighted K6 scores when also adjusting for age, age squared, gender, deprivation, religious status, parental status, relationship status, and employment status. Among Asian peoples, immigrant status was a significant predictor of psychological distress, with those born in NZ showing significantly lower K6 scores when controlling for other demographic covariates ($b = -.493$, $se = .173$, $\beta = -.236$, $t = 2.86$, $p = .005$). For Pacific peoples, in contrast, when controlling for other demographic factors, immigrant status did not significantly predict K6 scores ($b = -.279$, $se = .199$, $\beta = -.144$, $t =$

Table 5. Regression Models Predicting K6 Sum and IRT Scores in the New Zealand Population.

	Model predicting K6 classic sum scores			Model predicting IRT-weighted K6 scores		
	B	se(b)	t-value	B	se(b)	t-value
Constant	9.031	.421	21.437**	.862	.096	9.021**
Māori (0 no, 1 yes)	-.082	.185	-.443	.000	.042	-.001
Pacific (0 no, 1 yes)	.548	.355	1.545	.113	.081	1.401
Asian (0 no, 1 yes)	1.224	.345	3.548**	.242	.078	3.091**
Age	-.059	.005	-11.263**	-.013	.001	-11.241**
Age Squared ($Age - M_{age}$) ²	.000	.000	-1.057	.000	.000	-.653
Gender (0 women, 1 men)	-.053	.134	-.394	-.027	.030	-.877
Born in NZ (0 no, 1 yes)	-.141	.170	-.830	-.028	.039	-.733
NZ Dep Index (1-10)	.147	.024	6.139**	.031	.005	5.721**
Religious (0 no, 1 yes)	.181	.131	1.378	.046	.030	1.552
Parent (0 no, 1 yes)	-.539	.183	-2.946**	-.099	.042	-2.377*
Partnered (0 no, 1 yes)	-.771	.153	-5.029**	-.159	.035	-4.575**
Employed (0 no, 1 yes)	-.961	.171	-5.627**	-.190	.039	-4.903**

Notes. * $p < .05$, ** $p < .01$. Sample mean age was ($M_{age} = 50.93$ years), the NZ Dep Index was coded from 1 (most affluent regions) to 10 (most deprived regions) using the estimates for each meshblock area unit reported in White et al. (2008).

1.40, $p = .164$). Pacific peoples tended to report lower levels of psychological distress than Asian peoples regardless of whether or not they were born in New Zealand. These results indicate that there is a reliable difference in the levels of psychological distress experienced by first-generation Asian immigrants relative to Asian peoples born in NZ. However, this distinction is not apparent for first-generation Pacific immigrants versus Pacific peoples born in NZ.

Discussion

Our analyses showed that across the population as a whole, the K6 displayed acceptable item response parameters and operated much as expected (i.e., it provided the highest level of precision among those with a moderate-to-high level of psychological distress). In other words, our results indicate that the K6 is an appropriate screening measure that can be used to detect those with very high levels of non-specific psychological distress in New Zealand. IRT-weighted K6 scores provide more precise information about levels of psychological distress in the NZ population. Where possible, we recommend IRT-weighted scoring of the K6. Nevertheless, our comparative analyses indicated that the conclusions drawn from previous research using classical scoring methods (e.g., summing the K6 items or categorizing responses into bands representing low/none, moderate, or serious psychological distress) are also viable. These various scoring methods will likely yield comparable results in most (albeit certainly not all) cases.

Demographic differences in psychological distress: The New Zealand context

The present study also focused on ethnic group differences in levels of non-specific psychological distress in New Zealand. Pacific Nations and Asian peoples had the highest levels of mean IRT-weighted K6 scores. The finding that Pacific Nations peoples had the highest levels of non-specific psychological distress is consistent with results from the 2006/07 NZHS and the 2003/04 NZMHS (Mental Health Commission, 2011, 2012; Oakley Browne et al., 2010). However, the rank order differences in levels of

psychological distress documented for Asian peoples in our data differ from the K10 scores reported for Asian peoples in the 2006/07 NZHS. The 2006/07 NZHS reported that 7.7% of Asian peoples were classified as being above their threshold (a K10 score of 12 or more) for being at risk of an anxiety disorder or depression. Our results indicate that, in 2010, 9.9% of Asian peoples may be considered at risk of an anxiety disorder or depression. Notably, this is a higher rate than that observed for Māori peoples. Importantly, the rank order in the levels of psychological distress reported by different ethnic groups was also highly consistent when data were analyzed using the IRT-weighted K6 scores.

The high level of psychological distress observed for Asian peoples also complements Sibley and Ward's (in press) findings that Asian peoples have the highest level of race-based rejection expectations in New Zealand. Such expectations are proposed to result from real-life experiences of discrimination, which are associated with poor mental health (Harris et al., 2006; Gee et al., 2007). Although the disparity in psychological health between ethnic groups was reduced following a statistical adjustment for covariates, Asian peoples still had significantly higher mean IRT-weighted K6 scores than NZ Europeans/Pākehā, Māori and Pacific peoples. This robust ethnic group difference calls into question previous suggestions that socio-economic differences fully account for ethnic group differences in mental health (see Read, 2004). Our data clearly show that they do not. There is, however, the possibility that other as of yet unidentified factors are at play. Ethnic group differences in psychological distress cannot be simplified to mere socio-economic differences between groups (at least as measured by the widely used and validated NZ deprivation index).

More generally, we also provided a model identifying demographic factors uniquely associated with psychological distress in the NZ context (ethnicity, gender, age, deprivation, employment, religion, parenthood, and having a romantic partner). These demographic differences were the same for the K6

classical sum and IRT-weighted K6 scores. Interestingly, our results showed no significant difference between men and women in their K6 scores after adjusting for other demographic factors. This result is surprising given findings from the 2006/07 NZHS and the 2003/04 NZMHS (Mental Health Commission, 2011; Oakley Browne et al., 2010), as well as other research (Jose & Brown, 2008), showing higher rates of psychiatric illness among women relative to men. We also showed that K6 scores tended to decrease linearly with age. This pattern of results is consistent with findings from the 2003/04 NZMHS (Oakley Browne et al., 2010). Socio-Emotional Selectivity Theory proposes these decreased levels of psychiatric illness across the lifespan are due to older people being more motivated than younger people to have (or seek out) emotional satisfaction in life, as well as having better emotional regulation skills (Charles & Carstensen, 2007).

Unsurprisingly, deprivation was also strongly linked with increased levels of psychological distress (see Read, 2004, 2010). This likely occurs through two mechanisms; first, deprivation predisposes people to psychiatric illness (Social Causation Theory). Second, people may also 'drift' down into poverty due to a psychiatric illness (social drift/selection theory; Costello, Compton, Keeler, & Angold, 2003). More generally, the strong and consistent link between levels of deprivation and psychological distress mirrors a more general association between income and reduced stress, feeling able to meet ones needs, happiness, and subjective wellbeing (Sengupta et al., 2012). Employment was also a significant predictor of K6 scores. Respondents who were unemployed had higher K6 scores than those who were employed. These results are consistent with previous research demonstrating an association between unemployment and poor mental health (Duncan & Peterson, 2007). Those who are unemployed experience a loss of financial and non-financial factors that employment can offer, thus affecting their psychological well-being (Duncan & Peterson, 2007). In addition, those with a history of psychiatric illness face barriers to employment such as

discrimination and self-stigma (Duncan & Peterson, 2007).

A comment on K6 scale scoring

In our view, the K6 can be scored using either a classical measurement model (take the average of scale items), or a more advanced IRT-weighted scoring method. Our comparison of IRT-weighted and classical (summative) scores shows that, for the most part, the two scoring methods should generally yield similar results. As such, for the majority of research, K6 scale scores can be calculated simply by taking the sum (or average) score for the six items. This scoring method should be appropriate for the majority of research focusing on measuring variability in psychological distress using the K6 in small scale studies.

Conversely, an IRT-weighted scoring procedure will be more reliable than simply creating a summative scale score. This is because IRT-weighted scores take into account item discrimination parameters, thereby providing more reliable estimates for a given person depending upon their level of psychological distress. Those familiar with IRT could do this by applying the parameters reported here (or by using those previously reported by Kessler et al. (2002)) to weight people's scores on the K6 using one of the many available IRT scoring software packages. As shown in the current study, IRT-weighted K6 scale scores will tend to be more precise at high levels of the trait range. In particular, IRT-weighted scoring may be particularly important when one wants to maximize measurement precision in a research design. This may be particularly useful when the conclusions have important real-world implications for social policy. We advocate that IRT-weighted scoring be used for research designs where the aim is to select specific subpopulations for future research or intervention, as is often the case with health-intervention research.

Directions for future research: A focus on health and experiences of discrimination

Asian and Pacific Nations peoples report higher levels of psychological distress in New Zealand than do Māori

or Pākehā/European peoples. Moreover, our findings indicate that the gap in psychological health experienced by Asian peoples relative to the rest of the population could not be attributed to other demographic differences that we assessed. This implies that the effect is due to possible demographic factors that we failed to examine or some other experience shared by Asian peoples in New Zealand that is relatively unique to them. The lack of research focusing on the mental health of Asians in New Zealand (see Ho et al., 2003) is particularly concerning given recent population estimates suggesting that Asian peoples should reach 16% of the New Zealand population by 2026 (Ministry of Social Development, 2010). For Pacific peoples, in contrast, it seems that the relatively high levels of psychological distress may be attributed to demographic factors such as deprivation.

One possible explanation for the persistent gap in psychological health reported by Asian peoples is their heightened experiences with discrimination. New Zealanders pride themselves on being egalitarian and fair minded; indeed this seems to represent a core aspect of our meta-representation of national identity (Sibley, Hovard & Liu, 2011). Nevertheless, there is evidence suggesting that Asian people reliably report higher levels of discrimination in New Zealand relative to other ethnic groups (Harris et al., 2006; Sibley, 2011; Sibley & Ward, in press). Indeed, Asian peoples in New Zealand tend to be stereotyped as highly competent but highly cold (Sibley et al., 2011)—stereotypes that make them particularly vulnerable targets of discrimination. Specifically, research in other nations indicates that mixed high-competence but low-warmth stereotypes of this nature tend to predict hostile or overt forms of discrimination, such as threats and other forms of active harm and harassment. There is some evidence that this form of discrimination is particularly prevalent among Asian peoples in New Zealand (Sibley, 2011). Such stereotypes seem to be generally enduring, despite clear evidence that there is no reliable basis for such ethnic stereotypes in broad-scale demographic analyses of personality in New Zealand

(Sibley & Pirie, 2013). We suspect that racial discrimination experienced by Asian peoples across domains within New Zealand society may help explain why members of this group exhibited a persistent gap in psychological health outcomes when controlling for other demographic factors.

Our results highlight the need for policy-wide interventions to address disparities in mental health experienced by both Asian and Pacific peoples in New Zealand. Despite its considerable ethnic diversity, New Zealand primarily operates within a bicultural framework (Sibley & Ward, in press). This may have negative implications for minority groups who are not incorporated within this framework, particularly Asian peoples, as policies in place to assess their health needs are less clear (Workshop Organising Team, 2005). The move toward a tolerant and accepting multicultural New Zealand may be a challenge, as Asian and Pacific Nations peoples exhibit the highest expectations of race-based rejection (a barrier to achieving multiculturalism; see Berry & Kalin, 1995). People generally expressed significantly lower levels of positive affect toward Asian peoples in New Zealand (Sibley & Ward, in press). We expect that ethnic group disparities in psychological health will continue to persist without interventions and policies implemented to address the integration of, and inequalities experienced by, the Asian and Pacific Nations minority ethnic groups in New Zealand. Future research should investigate the links between expectations of race-based rejection, perceived discrimination, and the mental health of these minority groups.

Although we identified reliable variation between groups, it is important to keep in mind that there is also substantial variability in psychological distress among people *within* ethnic groups. What might predict some people being more at risk from anxiety or depressive disorders relative to others from their ethnic group? With regard to Māori, for example, Houkamau and Sibley (2011) have argued that cultural efficacy and active identity engagement may be a core aspect of identity that buffers the psychological wellbeing of Māori. Similarly, with

regard to Pacific people, Manuela and Sibley (in press) documented an identity tension effect whereby Pacific people who jointly identify as Pacific and European tend to be more likely to internalize negative stereotypes and affect toward Pacific people as a social group, which in turn corrodes their own identity and wellbeing. Research elaborating on these and other models of within-culture (and within-ethnic) patterns of variability in psychological distress and wellbeing for specific ethnic groups is needed. One promising avenue for such research would be to extend the culture-specific model of Māori identity identified by Houkamau and Sibley (2010) and Pacific identity identified by Manuela and Sibley (2013) to look at how various aspects of identity for these two ethnic groups operate as buffering factors for psychological health and wellbeing in the face of different life circumstances and events.

Concluding comments

The Kessler-6 (K6) is a six-item self-report measure of non-specific psychological distress designed for use in population screening surveys. This study documented item response parameters for the K6 in a New Zealand probability sample. The K6 demonstrated good measurement precision in the New Zealand population—and demographic differences in the K6 were broadly comparable across item-response weighted and classical summative scoring methods. We also presented regression models assessing demographic differences in psychological distress, as assessed using the K6. Critically, our models indicated that Pacific and Asian peoples exhibited the highest levels of psychological distress across scoring methods (9.9% of Asian peoples and 12.3% of Pacific peoples scored in the K6 range indicative of serious psychological distress). Māori and Pākehā/European peoples, in contrast, showed relatively low levels of psychological distress (7.2% of Māori and 4.7% of Pākehā/Europeans). The high level of psychological distress experienced by Asian peoples held when adjusting for numerous demographic covariates, including deprivation, immigrant status, religious affiliation, age, and employment.

Our findings provide a benchmark

documenting the relative levels of psychological distress reported by different ethnic groups in New Zealand in 2010. They also highlight the need for further research to investigate the driving force behind the poor psychological health experienced by Asian peoples in New Zealand. Our models indicate that this relationship cannot be accounted for by demographics such as employment or deprivation. We suspect that race-based rejection and experiences of discrimination may be important contributing factors in understanding this disparity in psychological health experienced by Asian peoples relative to other New Zealanders. Nevertheless, addressing disparities in economic deprivation should help to address part of this problem (albeit not its entirety). We challenge researchers in New Zealand to extend and develop more comprehensive models that explain this gap in psychological health outcomes across ethnic groups, and hope that the results we report here may aid in this collective endeavour. We need reliable and valid predictive models that incorporate socio-psychological components, such as experiences of discrimination, in order to best inform policy on how such issues may be addressed.

Acknowledgements

This manuscript is based on Ariana Krynen's honours research project supervised by Chris Sibley. This research was supported by a Te Whare Kura New Knowledge Acquisition Grant awarded to Carla Houkamau and Chris Sibley (#03903/1550).

References

- Berry, J. W., & Kalin, R. (1995). Multicultural and ethnic attitudes in Canada: An overview of the 1991 national survey. *Canadian Journal of Behavioural Science, 27*, 301-320.
- Cairney, J., Veldhuizen, S., Wade, T. J., Kurdyak, P., & Streiner, D. L. (2007). Evaluation of 2 measures of psychological distress as screeners for depression in the general population. *The Canadian Journal of Psychiatry/La Revue Canadienne de Psychiatrie, 52*(2), 111-120.
- Charles, S. T., & Carstensen, L. L. (2007). Emotion regulation and aging. In J.

- J. Gross (E.d.), *Handbook of emotion regulation* (pp. 307–327). New York: Guilford.
- Costello, E. J., Compton, S. N., Keeler, G., & Angold, A. (2003). Relationships between poverty and psychopathology: A natural experiment. *Journal of the American Medical Association, 290*(15), 2023-2029.
- Dohrenwend, B. P., Shrout, P. E., Egri, G., & Mendelsohn, F. S. (1980). Nonspecific psychological distress and other dimensions of psychopathology: Measures for use in the general population. *Archives of General Psychiatry, 37*(11), 1229 - 1236.
- Duncan, C., & Peterson, D. (2007). *The employment experiences of people with experience of mental illness: Literature review*. Auckland: Mental Health Foundation of New Zealand.
- Furukawa, T. A., Kessler, R. C., Slade, T., & Andrews, G. (2003). The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychological Medicine, 33*(2), 357-362.
- Gee, G. C., Spencer, M., Chen, J., Yip, T., & Takeuchi, D. T. (2007). The association between self-reported racial discrimination and 12-month DSM-IV mental disorders among Asian Americans nationwide. *Social Science and Medicine, 64*(10), 1984-1996.
- Hambleton, R. K., & Jones, R. W. (1993). Comparison of classical test theory and item response theory and their applications to test development. *Educational Measurement: Issues and Practices, 12*, 38-47.
- Harris, R., Tobias, M., Jeffreys, M., Waldegrave, K., Karlsen, S., & Nazroo, J. (2006). Racism and health: The relationship between experience of racial discrimination and health in New Zealand. *Social Science and Medicine, 63*, 1428-1441.
- Ho, E., Au, S., Bedford, C., & Cooper, J. (2003). *Mental health issues for Asians in New Zealand: A literature review*. Wellington: Mental Health Commission.
- Houkamau, C. A., & Sibley, C. G. (2011). Māori cultural efficacy and subjective well-being: a psychological model and research agenda. *Social Indicators Research, 103*, 379-398.
- Houkamau, C. A., & Sibley, C. G. (2010). The Multi-Dimensional Model of Māori Identity and Cultural Engagement. *New Zealand Journal of Psychology, 39*, 8-28.
- Jose, P. E., & Brown, I. (2008). When does the gender difference in rumination

- begin? Gender and age differences in the use of rumination by adolescents. *Journal of Youth and Adolescence*, 37(2), 180-192.
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S-L. T., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry*, 60(2), 184-189.
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S-L. T., Walters, E. E., & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32, 959-976.
- Kessler, R. C., Green, J. G., Gruber, M. J., Sampson, N. A., Bromet, E., Cuitan, M., & Zaslavsky, A. M. (2010). Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *International journal of methods in psychiatric research*, 19(S1), 4-22.
- Kessler, R. C., Berglund, P. A., Zhao, S., Leaf, P. J., Kouzis, A. C., Bruce, M. L., & Schneier, M. (1996). The 12-month prevalence and correlates of Serious Mental Illness (SMI). In R. W. Manderscheid, & M. A. Sonnenschein. (Eds), *Mental Health, United States 1996* (pp. 59 – 70). US Government Printing Office: Washington, DC.
- Manuela, S., & Sibley, C. G. (2013). The Pacific Identity and Wellbeing Scale (PIWBS): A culturally-appropriate self-report measure for Pacific peoples in New Zealand. *Social Indicators Research*, 112, 83-103.
- Manuela, S., & Sibley, C. G. (in press). Why do Pacific people with multiple ethnic affiliations have poorer subjective wellbeing? Negative ingroup affect mediates the identity tension effect. *Social Indicators Research*.
- Mental Health Commission (2011). *National Indicators 2011: Measuring mental health and addiction in New Zealand*. Wellington: Mental Health Commission.
- Mental Health Commission (2012). *National Indicators 2012: Measuring mental health and addiction in New Zealand*. Wellington: Mental Health Commission.
- Ministry of Health (2007). *The New Zealand Health Survey: Content Guide 2006-2007*. Wellington: Ministry of Health.
- Ministry of Health (2012). *The New Zealand Health Survey: Content Guide 2011-2012*. Wellington: Ministry of Health.
- Ministry of Social Development (2010). *The Social Report 2010*. Wellington: Ministry of Social Development.
- Mitchell, C. M., & Beals, J. (2011). The utility of the Kessler Screening Scale for psychological distress (K6) in two American Indian communities. *Psychological Assessment*, 23(3), 752-761.
- Oakley Browne, M. A., Wells, J. E., Scott, K. M., & McGee, M. A. (2010). The Kessler psychological distress scale in Te Rau Hinengaro: The New Zealand Mental Health Survey. *Australian and New Zealand Journal of Psychiatry*, 44(4), 314-322.
- Pinninti, N. R., Madison, H., Musser, E., & Rissmiller, D. (2003). MINI International Neuropsychiatric Schedule: Clinical utility and patient acceptance. *European Psychiatry*, 18(7), 361-364.
- Read, J. (2010). Can poverty drive you mad? 'Schizophrenia,' socio-economic status and the case for primary prevention. *New Zealand Journal of Psychology*, 39(2), 7-19.
- Read, J. (2004). Poverty, ethnicity, and gender. In J. Read, L. Mosher, & R. P. Bentall. (Eds.), *Models of madness: Psychological, social and biological approaches to schizophrenia*. (pp. 161 – 194). Hove, UK: Brunner-Routledge.
- Sengupta, N. K., Osborne, D., Houkamau, C. A., Hoverd, W. J., Wilson, M. S., Greaves, L. M., West-Newman, T., Barlow, F. K., Armstrong, G., Robertson, A., & Sibley, C. G. (2012). How much happiness does money buy? Income and subjective wellbeing in New Zealand. *New Zealand Journal of Psychology*, 41, 21-34.
- Sibley, C. G. (2011). The BIAS Treatment Scale (BIAS-TS): A measure of the subjective experience of active and passive harm and facilitation. *Journal of Personality Assessment*, 93, 300-315.
- Sibley, C. G. (2012). The Mini-IPIP6: Item Response Theory analysis of a short measure of the big-six factors of personality in New Zealand. *New Zealand Journal of Psychology*, 41, 21-31.
- Sibley, C. G., Harré, N., Hoverd, W. J., & Houkamau, C. (2011). The gap in the subjective wellbeing of Māori and New Zealand Europeans widened between 2005 and 2009. *Social Indicators Research*, 104, 103-115.
- Sibley, C. G., & Houkamau, C. A. (2013). The multi-dimensional model of Māori identity: Item Response Theory analysis of scale properties. *Cultural Diversity and Ethnic Minority Psychology*, 19, 97-110.
- Sibley, C. G., Hoverd, W. J., & Liu, J. H. (2011). Pluralistic and monocultural facets of New Zealand national character and identity. *New Zealand Journal of Psychology*, 40, 19-29.
- Sibley, C. G., Stewart, K., Houkamau, C., Manuela, S., Perry, R., Wootton, L., Harding, J. F., Zhang, Y., Sengupta, N., Robertson, A., Hoverd, W. J., West-Newman, T., & Asbrock, F. (2011). Ethnic group stereotypes in New Zealand. *New Zealand Journal of Psychology*, 40, 25-36.
- Sibley, C. G., & Pirie, D. J. (2013). Personality in New Zealand: Scale norms and demographic differences in the Mini-IPIP6. *New Zealand Journal of Psychology*, 42, 13-30.
- Sibley, C. G., & Ward, C. (in press). Measuring the preconditions for a successful multicultural society: a barometer test of New Zealand. *International Journal of Intercultural Relations*.
- Slade, T., Grove, R., & Burgess, P. (2011). Kessler psychological distress scale: Normative data from the 2007 Australian National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Psychiatry*, 45(4), 308-316.
- Statistics New Zealand (2006). *2006 Census of Populations and Dwellings*. Wellington, NZ: Statistics New Zealand.
- Sunderland, M., Slade, T., Stewart, G., & Andrews, G. (2011). Estimating the prevalence of DSM-IV mental illness in the Australian general population using the Kessler psychological distress scale. *Australian and New Zealand Journal of Psychiatry*, 45, 880-889.
- van der Linden, W. J., & Hambleton, R. K. (1997). *Handbook of modern item response theory*. Springer-Verlag: New York.
- Wang, P. S., Gruber, M. J., Powers, R. E., Schoenbaum, M., Speier, A. H., Wells, K. B., & Kessler, R. C. (2007). Mental health service use among Hurricane Katrina survivors in the eight months after the disaster. *Psychiatric Services* 58(11), 1403-1411.
- White, P., Gunston, J., Salmond, G., Atkinson, J., & Crampton, P. (2008). Atlas of Socio-economic deprivation in New Zealand. *Public Health Intelligence Occasional Bulletin*, 50. Ministry of Health: Wellington.
- Workshop Organising Team. (2005). *Issues and options paper: The use of the term 'Asian' in New Zealand and implications for research, policy development and community engagement*. Auckland: University of Auckland

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