Published in final edited form as:
*J Nurs Meas*. 2009 ; 17(1): 19–28.

# Support for the Reliability and Validity of a Six-Item State Anxiety Scale Derived From the State-Trait Anxiety Inventory

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## Abstract

Identifying the most efficient and theoretically appropriate methods to assess patient anxiety in fast-paced medical environments may be beneficial for clinical purposes as well as for research. The purpose of this study was to examine the reliability and validity of two previously published six-item versions of the State form of the State-Trait Anxiety Inventory (STAI) and to identify the version that would be most appropriate to use with a sample of parents who had infants with normal or abnormal newborn screens. In the current study, confirmatory factor analyses were conducted to evaluate the fit of the two six-item forms with STAI data collected at three time points from 288 parents of 150 infants. Study groups of parents were based upon infant newborn screens and subsequent diagnostic testing to include cystic fibrosis (CF; *n* = 26), congenital hypothyroidism (CH; *n* = 39, CF Carriers (CF-C; *n* = 45), and healthy infants (H; *n* = 40). The results showed the version containing items 1, 3, 6, 15, 16, and 17 of the State form of the STAI to be a better fitting model across all three time points, and it had better internal consistency than the version containing items 5, 9, 10, 12, 17, and 20. Both short forms were highly correlated with the 20-item STAI score, and all internal consistency reliabilities were greater than .90. It was concluded that the version containing item 1, 3, 6, 15, 16, and 17 of the State Anxiety scale was a reliable and valid instrument for this study sample.

### Keywords

measurement; psychometric properties; validity; reliability; state anxiety; State-Trait Anxiety Inventory

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A plethora of health-related research identifies anxiety as an important construct in the study of the human experience of health and illness. The State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983; STAI Web site, 2007) is one of the most widely used subjective measures of anxiety in health research. It contains two 20-item self-report scales designed to measure how much worry, tension or apprehension the subject experiences in his or her present circumstances (state anxiety) and how much anxiety represents a personality characteristic (trait anxiety). Items emphasize the frequency of particular symptoms (ranging from 1 = not at all to 4 = very much so). Although the STAI is a useful instrument, the fast-paced health care environment at times may preclude study participants from completing a 20-item scale, especially when the instrument is combined with other assessments. Furthermore, any steps that decrease the burden of research for potential

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participants may have a favorable impact upon sample size and therefore the quality of the findings. An example of a potentially high anxiety situation with limited time for completing paper and pencil assessments is during outpatient appointments for which parents bring their newborns in need of diagnostic testing following abnormal newborn screens. During these brief health encounters, potentially worried parents are bombarded with complicated information about their infants' health. Therefore, the purpose of this study was to evaluate the psychometric properties of a shorter six-item version of the State form of the STAI for future use in our research assessing the relationship between parental anxiety and cognitive understanding of infant medical test results.

## BACKGROUND AND CONCEPTUAL FRAMEWORK

The STAI (Spielberger et al., 1983) was based upon the theoretical conception of anxiety as having two facets. The State scale was designed to measure the transient state of arousal subjectively experienced as anxiety while the Trait scale was developed to assess the more enduring characteristic presence of this emotion. Items in each scale were based upon a 2-factor model of anxiety present or anxiety absent. This instrument has excellent psychometric properties. The median alpha reliability coefficients for the State and Trait scales (Form Y) are .92 and .90 respectively. Item remainder correlation coefficients for both scales (Form Y) have consistently been above .90 (Spielberger et al., 1983).

More recently, two non-theory based studies attempted to develop shortened versions of the 20-item State scale of the STAI. Marteau and Bekker (1992) conducted two studies using the original 20-item State form. In the first study, 20-item State Anxiety subscale data were collected from a sample of pregnant women just before their routine doctor's appointments. Item-remainder correlations were calculated and ranked in order of their contribution to the overall scores. Items with the highest coefficients were used to create five shortened tests (including 2-, 4-, 6-, 8-, and 10-item versions) with items on each version equally divided into anxiety present or anxiety absent constructs. All but the 2-item version had favorable correlations ($r > .90$). The second study evaluated the concurrent validity of the 4- and 6-item versions by comparing the scores from four study groups: medical students ($n = 38$), nursing students ($n = 45$), and medical students ($n = 38$), pregnant women (n = 200), and pregnant women with abnormal prenatal test results who were known to have high levels of anxiety ($n = 23$). Reliability coefficients were .91 for the 20-item scale, .82 for the 6-item scale and .77 for the 4-item version. There were no significant differences between the prorated means derived from the 6-item scale and the prorated means derived from the remaining 14 items, while there were significant differences between the prorated means calculated from the 4-item version and the remaining 16 items. The authors concluded that the psychometric properties of the 6-item form were acceptable. The copyright holder's policy for the STAI precluded reproducing the actual items in this article, therefore, each item has been listed by the item numbers as it appears in the original instrument. The Marteau and Bekker (1992) 6-item form consisted of items 3, 6, 17 (anxiety present) and 1, 15, 16 (anxiety absent) retaining the original scale's 2-factor model.

Chlan and colleagues (2003) also developed a 6-item version by analyzing the 20-item State scale data obtained from 192 critically ill patients who were hospitalized in intensive care units and treated with mechanical ventilation. Eight items from the original State scale were deemed inappropriate for the study population and therefore eliminated. Retaining the 2-factor model of the original 20-item version, an exploratory factor analysis was conducted with the remaining 12 items to identify the 6 items that most strongly correlated with the original 20-item scale. The resulting correlation coefficients ranged from .75 to .83 and this 6-item version was highly correlated ($r = .92$) with the 20-item scale. Items included 9, 17, 12 (anxiety present) and 10, 20, 5 (anxiety absent) from the original scale and accounted for 66.6% of the variance.

Additional diagnostic analyses using the Kaiser-Meyer-Olkin showed adequate sampling (.78). Bartlett's test of sphericity was significant ($p < .001$) and multicollinearity was acceptable (.21).

Only item 17 was found in both shortened versions of the STAI. Differences between the two short forms may be explained by the vastly different contexts of the anxiety-related phenomenon associated with each of the aforementioned study samples. If anxiety is viewed as an emotional response to a real or perceived threat, the Marteau and Bekker (1992) form may assess the more cognitive and anticipatory nature of anxiety experienced by the pregnant women in the Marteau and Bekker study (1992) as they wondered what the future might hold for their infants, themselves, and their new families. On the other hand, patients in the Chlan et al. (2003) study were critically ill with potentially life-threatening conditions requiring mechanical ventilation. Due to the immediacy and physical nature of their anxiety-related circumstances, these patients may have identified more strongly with the more somatic facet of anxiety. It is noteworthy that most of the eight problematic items eliminated in the Chlan et al. (2003) study can be considered cognitive in nature. In summary, both six-item versions of the STAI have been found to be reliable and valid relative to the original 20-item version. The Marteau and Bekker (1992) version appears to assess cognitive, future oriented, and global dimensions of anxiety while the Chlan et al. (2003) version seems to evaluate the more physical, immediate, and specific dimensions of anxiety. Given the paucity of data on a shortened version of the STAI and the conflicting findings about the most reliable and valid items, the goal of this investigation was to evaluate these two previously tested shortened versions of the state anxiety inventory for use in future health-related research, particularly with studies of parents with children who have chronic health conditions.

# METHOD

## Design and Procedures

With Institutional Review Board approval from the four participating medical centers, the subset of STAI data used in this investigation was taken from data for a larger longitudinal multimethod (qualitative and quantitative) study designed to examine the effects of neonatal screening and subsequent diagnosis on the parent-infant relationship and the potential mechanisms that may contribute to the quality of this relationship. Based upon theories of attachment (Belsky, 2005; Bowlby, 1973) and emotion regulation (Gross, 1999; Richards & Gross, 2000), parental anxiety was proposed to be one of the mediating variables related to the quality of interactions between parents and their infants. Given that the Marteau and Bekker (1992) instrument was validated with a sample that included a group of pregnant women, it was hypothesized that the Marteau and Bekker (1992) measure of state anxiety as a cognitive, future oriented, and global phenomenon would be a more salient, and therefore, more sensitive to state anxiety in parents of young infants than the Chlan et al. (2003) instrument.

## Study Sample

Four groups of parents with infants were included in this study: (a) infants having cystic fibrosis (CF) based upon abnormal newborn screen plus abnormal sweat test, DNA analysis, and/or symptoms; (b) infants with congenital hypothyroidism (CH) based upon abnormal newborn screen plus abnormal follow-up thyroid testing, (c) infants identified as CF carriers through newborn screening, and (d) healthy infants with normal screens and no chronic illnesses. Parents of infants who had multiple serious diagnoses, significant perinatal complications, low Apgar scores, and less than 32 weeks gestation were excluded from the study. The sample of 288 parents represented 150 families distributed among four study groups: cystic fibrosis (CF; $n = 26$), congenital hypothyroidism (CH; $n = 39$), CF Carriers (CF-C; $n = 45$), and healthy (H; $n = 40$).

### Recruitment and Data Collection

Invitational recruitment letters describing the longitudinal study were distributed to parents by clinic staff during routine appointments or mailing from the primary care or specialty clinics. Parents who were interested in the study were referred to the researchers for more information. Subsequently home visits were conducted during which their questions were answered, written consent was obtained, and data were collected.

All STAI assessments were completed by parents during in-home assessments at 3 data points during the infants' first year of life: about 2 months, 6 months, and 12 months. There were 267 parents (139 mothers) participated in the Time 1 assessment; 268 parents provided data at Time 2 (140 mothers); and 239 parents (125 mothers) were surveyed at Time 3.

### Data Analysis

Parental dyadic differences were examined using simple parametric and categorical contrasts of mothers and fathers. Confirmatory factor analysis was performed through Mplus, version 4.21 (Muthén & Muthén, 2007) in order to examine indicators of fit for the two different STAI short forms. Weighted least square parameter estimates using a diagonal weight matrix (WLSMV) was used due to the categorical nature of the items. Because chi-square values can be susceptible to sample sizes, relative goodness-of-fit statistics, including Tucker–Lewis Index (TLI), Comparative Fit Index (CFI), and Weighted Root Mean Square Residual (WRMR) were used for model evaluation. The TLI and CFI values that are greater than .95 indicate a good fit, and WRMR values of less than .90 are desired (Yu, 2002).

We also examined parental invariance by regressing the latent factor (e.g., short form scale) onto a parental covariate (e.g., 0 = father, 1 = mother). This approach has been referred to as MIMIC models (MIMIC = multiple indicators, multiple causes; Joreskog and Goldberger, 1975; Muthén, 1985). A longitudinal MIMIC model (Muthén and Muthén, 2007) was also used to assess the sensitivity of both subscales relative to infant condition (e.g., 0 = normal, 1 = abnormal) across the three time periods. Individual scale items were allowed to correlate across the three time periods, with the latent factor subscale regressed on the infant condition at each time period.

## RESULTS

Chi square based contrasts using exact probability for all data at Time 1 showed significant differences in fathers' age. Fathers of infants diagnosed with a health condition tended to be older than fathers of infants with no diagnoses. There was also a higher proportion of mothers of European descent in the group with no neonatal diagnosis as compared with the mothers of infants with neonatal diagnoses. As shown on Table 1, all other demographics were not significantly different.

The different versions of the six-item short form STAI were evaluated by examining measures of internal consistency as well as by examining goodness of fit for the data collected at each of the three assessment periods. The internal consistency of the 20-item STAI at each assessment was comparable to that seen in other research, all alphas > .90. Across the three time points, the Marteau and Bekker (1992) short form had equal (.79 at Time 1) or stronger (.79 at Time 2 and .81 at Time 3) coefficient alphas than did the Chlan et al. (2003) version, .79 at Time 1 and Time 3 and .75 at Time 2. Scores on both short forms were strongly correlated with the overall 20-item STAI score at each assessment and virtually identical to one another, all *r*'s > .90. Results for the two short forms were comparable when data were examined for mothers and fathers separately at each time point, with Cronbach alphas ranging from .74 to .82, and short form correlations with the 20-item STAI ranging from .92 to .95.

The results of the confirmatory factor analyses on each of these measures and at each of the three time points, indicated that the Marteau and Bekker (1992) fit the data slightly better than did the Chlan et al. (2003) short form (see Table 2). Detailed item specific results are also provided on Tables 3 and 4. Results of the standardized loadings for both the Marteau and Bekker (1992) and Chlan et al. (2003) short form scales are provided in Table 5 for each time period.

The results of the MIMIC model nonsignificant direct effects of the covariate indicate population homogeneity, or that the factor means were not different at different levels of the covariate (see Table 6). No differences between the fathers and mothers were detected, supporting mother and father measurement invariance.

Results of the longitudinal MIMIC model (see Table 7) show that both subscales indicated statistically significant higher parental anxiety scores for parents of infants diagnosed with chronic health conditions as compared with parents of infants without medical conditions identified through newborn screening at time period 1, demonstrating sensitivity.

## DISCUSSION

The results of this study showed the Marteau and Bekker (1992) six-item version of the State Anxiety scale to have favorable internal consistency reliability and validity when correlated with the parent 20-item State scale. The results of the confirmatory factor analysis indicated that the Marteau and Bekker (1992) provided a better fitting model of the STAI data than did the Chlan et al. (2003) version for our study sample. The correlations between this short form and the 20-item version used in our study sample had an even more robust relationship than those found by Marteau and Bekker (1992). These results were also consistent across three points in time that extended about 10 months. The finding of higher anxiety only at Time 1 for parents with an infant who had a serious health condition is not surprising. These parents are likely to be concerned about the new diagnosis and still learning how to meet their infant's special needs. By 6 months, parents are likely to have adjusted to the diagnosis as well as the related care and they feel more confident in their parenting capacities. Thus, their levels of anxiety are likely to be diminished. Therefore, the lack of statistical differences between parental groups at later time points is not likely to be indicative of poor sensitivity of the instrument. These findings are conceptually consistent with the premise that our study sample was contextually more similar to the sample of pregnant women in the Marteau and Bakker (1992) study than to the critically ill sample of the Chlan et al. study. The phenomenological experience of anxiety in pregnant women may be similar to that of new parents, especially when samples from each study include parents who received abnormal test results about their infants. Thus, these findings expand the potential applicability of this short form to include male respondents, as well as adults who are parents of both healthy infants and those whose infants have known health problems.

### Implications for Research

Although the analysis was performed with a reasonable sample size, the homogeneity of the group in terms of age and ethnicity represents a limitation of the study. Still, these findings are very encouraging and offer a concise alternative when measuring anxiety, a commonly studied construct in the social sciences. Further research is needed to examine the psychometric properties of this short version in other populations.

### Conclusions

The results of the confirmatory factor analyses on each of these measures and at each of the three time points, indicated that the Marteau and Bekker (1992) short form scale fitted data slightly better than did the Chlan et al. (2003) short form for this sample of parents of healthy infants as well as parents with infants who have chronic health conditions. Both short forms demonstrated mother and father invariance and the sensitivity to detect group differences in levels of anxiety as expected across data points.

## Acknowledgments

We would like to thank the families who participated in this study and the research teams who assisted with the implementation of this research which was funded by the National Institute of Health (K23HD42098).

## REFERENCES

Belsky, J. Attachment theory and research in ecological perspective. In: Grossmann, Klaus E.; Grossmann, K.; Waters, E., editors. Attachment from infancy to adulthood: The major longitudinal studies. The Guilford Press, Inc.; New York: 2005. p. 71-97.

Bowlby, J. Attachment and loss: Vol 2 Separation: Anxiety and anger. Basic Books; New York: 1973.

Chlan L, Savik K, Weinert C. Development of a shortened state anxiety scale from the Speilberger State-Trait Anxiety Inventory (STAI) for patients receiving mechanical ventilatory support. Journal of Nursing Measurement 2003;11(3):283–293. [PubMed: 15633782]

Gross, JJ. Emotion and emotion regulation. In: Pervin, LA.; John, OP., editors. Handbook of personality: Theory and research. Vol. 2nd ed.. Guilford Press; New York: 1999. p. 525-552.

Joreskog KG, Goldberger AS. Estimation of a model with multiple indicators and multiple causes of a single latent variable. Journal of the American Statistical Association 1975;70:631–639.

Marteau T, Bekker H. The development of a six-item short-form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI). British Journal of Psychology 1992;31(3):301–306.

Muthén B. A method for studying the homogeneity of test items with respect to other relevant variables. Journal of Educational Statistics 1985;10(2):121–132.

Muthén, LK.; Muthén, BO. Mplus. Vol. Version 4.21. Muthén & Muthén; Los Angeles: 2007.

Richards JM, Gross JJ. Emotion regulation and memory: The cognitive cost of keeping one's cool. Journal of Personality and Social Psychology 2000;79:410–424. [PubMed: 10981843]

Spielberger, CD.; Gorsuch, RL.; Lushene, R.; Vagg, PR.; Jacobs, GA. Manual for the State-Trait Anxiety Inventory. Consulting Psychologists Press, Inc.; Palo Alto, CA: 1983.

State-Trait Anxiety Inventory Web site. 2007. Retrieved February 6, 2008, from http://www.mindgarden.com/products/staisad.htm

Yu, CY. Doctoral dissertation. University of California; Los Angeles: 2002. Evaluating cutoff criteria of model fit indices for latent variable models with binary and continuous outcomes.

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## TABLE 1

Parent Dyad Demographic Characteristics

| | Healthy Infants | | Infants with Chronic Conditions | | Parental Contrasts | |
|---|---|---|---|---|---|---|
| | **Mother *n* = 85** | **Father *n* = 81** | **Mother *n* = 65** | **Father *n* = 57** | **Mother Contrast** | **Father Contrast** |
| Age | 29.07 (5.31) | 30.55 (4.89) | 30.27 (5.95) | 32.98 (7.40) | $t = -1.29$, $\alpha = .19$ | $t = -2.31$, $\alpha = .02$ |
| European descent | 98.82% | 97.53% | 89.23% | 92.98% | $\chi 2 = 6.71$, $df = 1$, $\alpha_E = .012$ | $\chi 2 = 1.664$, $df = 1$, $\alpha_E = .23$ |
| Married | 82.35% | 85.19% | 80.00% | 87.72% | $\chi 2 = .134$, $df = 1$, $\alpha_E = .833$ | $\chi 2 = .181$, $df = 1$, $\alpha_E = .803$ |
| Educational Level | | | | | $\chi 2 = 3.727$, $df = 3$, $\alpha_E = .292$ | $\chi 2 = 2.100$, $df = 3$, $\alpha_E = .559$ |
| High school/GED | 12.94% | 27.50% | 18.46% | 25.00% | | |
| Community college/trade school | 22.35% | 21.25% | 32.31% | 32.14% | | |
| Baccalaureate college degree | 44.71% | 35.00% | 32.31% | 28.57% | | |
| Graduate/professional degree | 20.00% | 16.25% | 16.92% | 14.29% | | |
| Income levels | | | | | $\chi 2 = 2.54$, $df = 5$, $\alpha_E = .776$ | $\chi 2 = 0.485$, $df = 3$, $\alpha_E = .992$ |
| Less than $20,000 | 9.41% | 5.00% | 12.31% | 5.36% | | |
| $20,000 – $40,000 | 22.35% | 21.25% | 21.54% | 21.43% | | |
| $41,000 – $60,000 | 21.18% | 25.00% | 23.08% | 25.00% | | |
| $61,000 – $80,000 | 21.18% | 20.00% | 12.31% | 16.07% | | |
| $81,000 – $100,000 | 9.41% | 10.00% | 9.23% | 12.50% | | |
| More than $100,000 | 16.47% | 18.75% | 21.54% | 19.64% | | |

*Note*. $\alpha$ = asymptotic error. $\alpha_E$ = exact errorM

**TABLE 2**

Psychometric and Model Fit Evaluation

| | Time 1 (n = 267) | Time 2 (n = 268) | Time 3 (n = 239) |
|---|---|---|---|
| Coefficient alpha | | | |
| 20-item STAI | .912 | .923 | .927 |
| Marteau and Bekker short form | .793 | .795 | .811 |
| Chlan et al. short form | .791 | .750 | .792 |
| Correlations with 20-item STAI | | | |
| Marteau and Bekker short form | .953 | .937 | .954 |
| Chlan et al. short form | .948 | .944 | .946 |
| Comparative fit index (CFI) | | | |
| Marteau and Bekker short form | .928 | .954 | .988 |
| Chlan et al. short form | .923 | .910 | .958 |
| Tucker-Lewis index (TLI) | | | |
| Marteau and Bekker short form | .949 | .954 | .986 |
| Chlan et al. short form | .908 | .895 | .942 |
| Weighted root mean square residual | | | |
| Marteau and Bekker short form | .861 | .953 | .599 |
| Chlan et al. short form | 1.436 | 1.252 | 1.181 |

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## TABLE 3

Marteau and Bekker Short Form Cronbach's Alpha and Item Statistics

| | Time 1 | | Time 2 | | Time 3 | |
|---|---|---|---|---|---|---|
| **Item** | **Alpha if Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** | **Alpha if Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** | **Alpha of Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** |
| STAI1 | .762 | .547 | .744 | .583 | .762 | .629 |
| STAI3 | .776 | .488 | .758 | .527 | .782 | .544 |
| STAI6 | .790 | .423 | .782 | .440 | .802 | .467 |
| STAI15 | .733 | .656 | .719 | .675 | .743 | .702 |
| STAI16 | .730 | .673 | .743 | .584 | .773 | .590 |
| STAI17 | .769 | .513 | .775 | .454 | .791 | .505 |
| Total | .793 | | .787 | | .807 | |

## TABLE 4

Chlan, Savik, and Weinert Short Form Cronbach's Alpha and Item Statistics

| | Time 1 | | Time 2 | | Time 3 | |
|---|---|---|---|---|---|---|
| **Item** | **Alpha if Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** | **Alpha if Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** | **Alpha if Item Deleted Coefficient** | **Item to Total (Remainder) Correlation** |
| STAI5 | .751 | .577 | .688 | .568 | .743 | .621 |
| STAI9 | .796 | .345 | .755 | .309 | .789 | .464 |
| STAI10 | .726 | .663 | .671 | .618 | .742 | .613 |
| STAI12 | .781 | .429 | .729 | .421 | .784 | .429 |
| STAI17 | .736 | .625 | .717 | .469 | .758 | .552 |
| STAI20 | .739 | .611 | .690 | .561 | .727 | .669 |
| Total | .789 | | .748 | | .791 | |

## TABLE 5

Standardized Factor Loadings with 95% Confidence Intervals for Marteau and Bekker and Chlan, Savik, and Weinert Instruments

| **Marteau** | **Time1** | **Time 2** | **Time 3** |
|---|---|---|---|
| STAI1 | .699(.620, .778) | .767(.702, .833) | .806(.732, .880) |
| STAI3 | .619(.519, .719) | .660(.579, .742) | .691(.614, .767) |
| STAI6 | .682(.552, .812) | .723(.579, .867) | .790(.651, .930) |
| STAI15 | .846(.793, .900) | .880(.819, .942) | .876(.817, .934) |
| STAI16 | .871(.821, .921) | .766(.698, .834) | .761(.682, .839) |
| STAI17 | .656(.565, .746) | .621(.512, .730) | .658(.553, .763) |
| Chlan | | | |
| STAI5 | .774(.708, .840) | .797(.731, .863) | .807(.742, .872) |
| STAI9 | .669(.582, .756) | .619(.441, .797) | .818(.701, .934) |
| STAI10 | .850(.799, .902) | .806(.738, .874) | .847(.777, .916) |
| STAI12 | .627(.522, .732) | .597(.489, .706) | .668(.548, .788) |
| STAI17 | .804(.742, .867) | .658(.550, .766) | .716(.626, .806) |
| STAI20 | .767(.708, .827) | .767(.701, .833) | .818 (.765, .872) |

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**TABLE 6**

Multiple Indicators, Multiple Causes (MIMIC) Model Invariance for Mothers and Fathers

| | Estimate | 95% CI |
|---|---|---|
| Marteau and Bekker short form | | |
| Time1 | .010 | −.180, .200 |
| Time 2 | .120 | −.087, .328 |
| Time 3 | .059 | −.180, .297 |
| Chlan et al. short form | | |
| Time 1 | .002 | −.204, .209 |
| Time 2 | .005 | −.221, .232 |
| Time 3 | .034 | −.202, .269 |

*Note*. CI = confidence intervals.

**TABLE 7**

Longitudinal MIMIC Model on the Effect of Abnormal Versus Normal Test Results

| | **Estimate** | **95% CI** |
|---|---|---|
| Marteau and Bekker short form | | |
| Time 1 | .199 | .009, .388 |
| Time 2 | .081 | −.131, .293 |
| Time 3 | .093 | −.147, .334 |
| Chlan et al. short form | | |
| Time 1 | .412 | .193, .631 |
| Time 2 | .091 | −.123, .305 |
| Time 3 | .170 | −.066, .406 |

*Note*. CI = confidence intervals.