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Brian E. Armenta
University of Nebraska-Lincoln, barmenta@unl.edu

Les B. Whitbeck
University of Nebraska-Lincoln, lwhitbeck2@unl.edu

Patrick Habecker
University of Nebraska-Lincoln, phabecker2@unl.edu

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The Historical Loss Scale: Longitudinal Measurement Equivalence and Prospective Links to Anxiety Among North American Indigenous Adolescents

Brian E. Armenta, **Les B. Whitbeck**, and **Patrick N. Habecker**
Department of Sociology, University of Nebraska-Lincoln

Abstract

Objectives—Thoughts of historical loss (i.e., the loss of culture, land, and people as a result of colonization) are conceptualized as a contributor to the contemporary distress experienced by North American Indigenous populations. Although discussions of historical loss and related constructs (e.g., historical trauma) are widespread within the Indigenous literature, empirical efforts to understand the consequence of historical loss are limited, partially because of the lack of valid assessments. In this study we evaluated the longitudinal measurement properties of the Historical Loss Scale (HLS)—a standardized measure that was developed to systematically examine the frequency with which Indigenous individuals think about historical loss—among a sample of North American Indigenous adolescents. We also test the hypothesis that thoughts of historical loss can be psychologically distressing.

Methods—Via face-to-face interviews, 636 Indigenous adolescents from a single cultural group completed the HLS and a measure of anxiety at 4 time-points, which were separated by 1- to 2-year intervals (*M* age = 12.09 years, *SD* = .86, 50.0% girls at baseline).

Results—Responses to the HLS were explained well by 3-factor (i.e., cultural loss, loss of people, and cultural mistreatment) and second-order factor structures. Both of these factor structures held full longitudinal metric (i.e., factor loadings) and scalar (i.e., intercepts) equivalence. In addition, using the second-order factor structure, more frequent thoughts of historical loss were associated with increased anxiety.

Conclusions—The identified 3-factor and second-order HLS structures held full longitudinal measurement equivalence. Moreover, as predicted, our results suggest that historical loss can be psychologically distressing for Indigenous adolescents.

Keywords

historical loss; historical trauma; Indigenous adolescents; measurement equivalence/invariance

Some experiences are common among members of ethnic and cultural minority groups in North America. For example, members of ethnic and cultural minority groups typically

Correspondence concerning this article should be addressed to Brian E. Armenta, Department of Psychological Sciences, University of Missouri-Columbia, 124E Psychology Building, Columbia, MO 65211. armentab@missouri.edu.
Brian E. Armenta is now at Department of Psychological Sciences, University of Missouri - Columbia.

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experience some degree of discrimination and have to navigate two (or more) cultural systems. At the same time, some experiences are more common among members of specific ethnic and cultural minority groups (Armenta et al., 2013). Of specific relevance to the present study, individuals who are indigenous to North America (i.e., American Indians, Alaskan Natives, and Canadian First Nations people) often experience psychological trauma stemming from the historical and ongoing atrocities perpetrated on their people as a result of European colonization (Duran & Duran, 1995). This psychological trauma is one aspect of what scholars have referred to as historical trauma or historical grief (Brave Heart & DeBruyn, 1998), which may be defined as the "cumulative emotional and psychological wounding over the lifespan and across generations emanating from massive group experiences" (Brave Heart, 2003, p. 5; cf. Walters, Mohammed, et al., 2011).

The extent to which Indigenous individuals think about the loss of their culture, land, and people stemming from European colonization is conceptualized as one contributor to contemporary experiences of historical trauma. Scholars have referred to this construct as historical loss (HL; Whitbeck, Adams, Hoyt, & Chen, 2004; cf. Jervis et al., 2006). HL is rooted in a history of colonization but represents a contemporary experience, as it involves the ongoing thoughts of many Indigenous people within today's society. As such, direct experiences with the events that resulted in the losses to one's cultural group are not a necessary condition for one to think about those losses, or for one to be affected by thoughts about those losses. The only precondition for one to think about, and thus be affected by, HL is the awareness that the losses have occurred, which is widespread among Indigenous populations, especially among those who live on their cultural group's reservation/reserve.

Using longitudinal data collected from a large sample of North American Indigenous adolescents, the goal of the present study was twofold. First, we examined the stability in the measurement properties (i.e., longitudinal measurement equivalence) of the Historical Losses Scale (HLS; Whitbeck et al., 2004), a widely used standardized measures of HL (Walls & Whitbeck, 2012), from early to late adolescence. Second, Walls and Whitbeck (2012) contended that thoughts about historical loss may be conceptualized as a stressor; as such, thoughts about HL are argued to have similar negative health and psychosocial consequences as general stressors, including increased psychological distress. We evaluated this contention by testing the prediction that more frequent thoughts about HL will lead to subsequent increases in anxiety.

The HLS (Whitbeck et al., 2004) is a standardized measure that assesses *the frequency with which Indigenous individuals think about the losses to their culture, land, and people as a result of European colonization*. The items for the measure were written based on a series of focus groups with Indigenous elders on two upper Midwestern U.S. Reservations and discussions with Tribal advisory boards, Tribal members, and Indigenous scholars. The items were subsequently presented to Indigenous elders and Tribal advisory board members on two upper Midwestern U.S. Reservations and two Canadian First Nations Reserves, and were revised based on their feedback. Importantly, the items were developed, revised, and finalized based on the input from individuals who identify as members of a single Indigenous cultural group. Speaking to the possibility of a general Indigenous cultural measure, however, the HLS has been included in studies conducted with members of other

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Indigenous cultural groups, albeit at times with minor modifications to the items (for further discussion, see Walls & Whitbeck, 2012).

The final HLS, which is provided in Appendix A, includes 12 items. Participants are asked to indicate the frequency with which they think about the losses to their culture, land, and people since their cultural group first came into contact with Europeans/Whites. Responses are provided on a 6-point scale, anchored by (1) *several times a day* and (6) *never*. Composite scale scores are computed by reverse scoring the item responses and either averaging or summing across the responses to the item. Initial maximum likelihood-based exploratory factor analysis using data collected from 143 Indigenous adults (*M* age = 38.98 years, Range = 28 to 59 years; 78% women) on two upper Midwestern U.S. American Indian Reservations and two Canadian First Nations Reserves suggested that the 12 items were adequately explained by a single latent factor (Whitbeck et al., 2004).

Although the HLS was developed and validated with Indigenous adults (Whitbeck et al., 2004), an adolescent version has been used in studies conducted with Indigenous youths (see Whitbeck, Sittner Hartshorn, & Walls, 2014). The adolescent version of the HLS is identical to the adult version, but excludes two items that were deemed to be inappropriate for youths; namely, items 7 and 8 (see Appendix A). Despite being used with Indigenous adolescents, the measurement properties of the HLS among adolescents have not yet been examined. To address this issue we sought to test whether the HLS holds equivalent measurement properties (i.e., metric and scalar equivalence) from early to late adolescence. Demonstrating that the HLS holds longitudinal measurement equivalence is necessary to ensure that any similarities and/or differences in the correlates of HL (metric equivalence) and comparisons in HL (scalar equivalence) across adolescence are not influenced by measurement artifacts (Vandenberg & Lance, 2000). In addition to examining the measurement properties of the HLS, we examined the prospective link from the HLS to anxiety. Given that HL has been conceptualized as a stressor (Walls & Whitbeck, 2012), we hypothesized that more frequent thoughts about HL would be associated with subsequent increases in anxiety. We had no strong reason to believe that anxiety would increase the frequency of HL thoughts. To be comprehensive, however, we considered the potential reciprocal associations between the HLS and anxiety.

Method

Study Design

The data for the present study were drawn from an 8-year longitudinal project examining risk and resilience among North American Indigenous adolescents who share a common culture and language living on or near seven American Indian Reservations/Canadian First Nations Reserves (Whitbeck et al., 2014). At each study location, Tribal advisory boards were responsible for advising the research team on questionnaire development and supervising study personnel. As part of confidentiality agreements, the name of the cultural group and study locations are not disclosed, and no attempts were made to examine differences across the study locations.

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Before the first wave of data collection, each participating Reservation/Reserve provided the research team with a list of all families who had a tribally enrolled child between the ages of 10 and 12 years and lived on or near the Reservation/Reserve. An attempt to contact all families was made to achieve a representative sample of the target population. Families were formally recruited for the study through personal interviewer visits, during which the families were presented with a culture-specific traditional gift and an overview of the project. For those families who agreed to participate (79.4% of those contacted), the target adolescent and at least one adult caretaker were interviewed annually for 8 years, beginning in 2002.

All interviewers and site coordinators were approved by the tribal advisory boards and were either enrolled tribal members or, in a very few cases, nonmember spouses of enrollees. Interviewers were trained prior to each wave of data collection regarding methodological guidelines of personal interviewing and protection of human subjects. Participating families were given $40 for each participant at each wave as compensation for completing the study. The study was conducted in compliance with the ethical standards outlined by the American Psychological Association (2010) and was approved by the Institutional Review Board at the University of Nebraska-Lincoln.

Participants

The HLS was administered to the adolescent participants at Waves 2, 3, 5, and 7 of the study (cf. below). Importantly, only 14 adolescents dropped out of the longitudinal study before completing the second wave of data collection. The final analytic sample included 636 youths at Wave 2 (M age = 12.09 years, SD = .86, 50.0% girls), 626 youths at Wave 3 (M age = 13.06 years, SD = .87, 50.7% girls), 605 youths at Wave 5 (M age = 15.27 years, SD =.97, 50.7% girls), and 569 youths at Wave 7 (M age = 17.23 years, SD =.88, 51.0% girls). In total, 660 adolescents completed one or more waves of the study.

Measures

For descriptive purposes, composite scale scores were computed for each of the following measures by averaging across responses to the individual items. The means, standard deviations, coefficient alphas, and correlations among the variables are reported in Table 1.

Historical loss—The frequency with which adolescence think about historical loss was measured using the Historical Loss Scale (Whitbeck et al., 2004), which is provided in Appendix A and described in detail in the introduction. The adolescent version of the measure was used, which includes 10 items. Responses were provided on a 6-point scale, anchored by (1) *several times a day* and (6) *never*. The responses were reverse scored so that higher values indicate more frequent thoughts about HL.

As a result of agreements with the individual Tribal councils, the HLS was administered to participants at one of the seven Reservations/Reserves at Wave 2 (n = 177), five of the Reservations/Reserves at Wave 3 (n = 422), and all of the Reservations/Reserves at Waves 5 (n = 605) and 7 (n = 569). Because the missing data at Waves 2 and 3 are missing by design (Graham, Taylor, Olchowski, & Cumsille, 2006), they may be treated as missing completely at random (MCAR; Little & Rubin, 2002). This allowed us to include the data collected during Waves 2 and 3 in our longitudinal analyses and obtain unbiased parameters estimates using full information maximum likelihood estimation (see Enders, 2010).

Anxiety—Anxiety was measured with the Tri-Ethnic Center for Prevention Research Anxiety measure (Oetting, Swaim, Edwards, & Beauvais, 1989; Swaim, Oetting, Edwards, & Beauvais, 1989), which assesses global feelings of anxiety. Participants responded to 4 questions, including "Do you worry about things?," "Are you nervous?," "Are you anxious?," and "Do you get tense and jumpy?" Responses were coded on a 3-point scale, anchored by (0) *none of the time* and (2) *most of the time*.

Results

We conducted preliminary analyses to verify the factor structure of the HLS for each wave separately. To this end, using Mplus Version 6.1 (Muthén & Muthén, 1998–2010) with full information maximum likelihood estimation (FIML), we estimated a series of confirmatory factor models, with the 10 HLS items specified as observed indicators of a single latent variable. The original data were used in these and all subsequent analyses (as opposed to a covariance or correlation matrix). The models were identified by fixing the factor loading and item intercept for a single item to 1 and 0, respectively. We evaluated the overall fit of this model using three fit indices; specifically, the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean error residual (SRMR). Following Hu and Bentler (1999), we determined that a model provided a good fit to the data with a CFI value close to or above .95, RMSEA value close to or below .06, and SRMR value close to or below .08. Chi-square (χ^2) values are reported but were not used to evaluate overall model fit owing to the sensitivity of this test statistic to sample size (Bollen, 1989).

As shown in Table 2, the single factor model provided a poor fit to the data at each wave. Despite this fact, as shown in Appendix B, each of the items loaded very highly on the latent variable. Moreover, maximum likelihood-based exploratory factor analyses suggested that the items tap into a single global construct (i.e., all items loaded highly on the first latent variable), but that the residual variances for some of the items formed additional factors. These results suggest that all of the HLS items tap into a single global construct, but that subsets of items may tap into more specific components of HL. We thus categorized the items into three groups based on conceptual similarity. The first category includes four items that tap into the general loss of culture (i.e., items 1–4; see Appendix A), the second category includes two items that tap into the loss of people (i.e., items 5–6), and the third category includes four items that tap into cultural mistreatment (i.e., items 7–10).

We reestimated the models using this three-factor structure, with the factors allowed to correlate. The models were identified by fixing a single factor loading and item intercept for each latent variable to 1 and 0, respectively. As shown in Table 2, the three-factor structure provided a good fit to the data for each wave. The standardized factor loadings for these models are provided in Appendix B and the zero-order correlations between the three factors are provided in Appendix C (above the diagonal). We next estimated longitudinal

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measurement models for the one- and (correlated) three-factor structures. To this end, the items for each wave served as observed indicators for the HL factor/factors, and the residual variances for like-items (e.g., item 1 for Waves 2, 3, 5, and 7) were allowed to covary across measurement points to account for temporal stability in item specificities (Vandenberg & Lance, 2000). The model was identified by fixing a single factor loading and item intercept for each latent variable to 1 and 0, respectively. As shown in Table 2, the one-factor longitudinal model provided a poor fit to the data while the three-factor longitudinal model provided a good fit to the data. The factor loadings for these models are provided in Appendix B. The zero-order correlations between the factors for the three-factor longitudinal model are provided in Appendix C (below the diagonal).

As shown in Appendix C (in bold for ease of identification), the correlations among the three factors within each wave ranged from a low of .69 to a high of .88, with an average of .81 (*SD* = .05) for the within-wave models and .81 (*SD* = .06) for the longitudinal model. Subsequent analyses showed that the three HL factors were similarly associated with anxiety and that simultaneously including the three factors as predictors of anxiety led to null effects for each factor owing to issues with collinearity. Taken together, these results suggest that a second-order factor composed of three first-order factors provided better predictive utility for our specific analyses. There may be reasons, however, to further consider the three factors separately; these reasons are addressed in the discussion section. We thus conducted our tests of measurement equivalence using both the three-factor and second-order factor structures. The final longitudinal measurement models are shown in Figures 1 (second-order structure) and 2 (three-factor structure).

For our primary analyses, we (a) considered the degree to which the measurement properties of the HLS were equivalent across time and (b) tested our hypothesis that more frequent thoughts of HL will be linked to subsequent increases in anxiety.

Longitudinal Measurement Equivalence

Focusing first on the second-order factor structure, we tested for the equivalence in the first- and second-order factor loadings across time (*longitudinal metric equivalence*), and the equivalence of the observed item and first-order latent variable intercepts across time (*longitudinal scalar equivalence*). This involved the estimation of five models with increasing levels of constraints placed on the measurement parameters (Chen, Sousa, & West, 2005). For the first model, the factor loadings for the first- and second-order latent variables and the intercepts for the observed items and first-order latent variables were allowed to estimate separately across the time-points (*unconstrained model*). For model identification, the factor loading for a single observed item for each first-order latent variable was fixed to 1, the factor loading for a single first-order latent variable for the second-order latent variables was fixed to 1, the intercept for a single observed item for each first-order latent variable was fixed to 0, and the intercept for a single first-order latent variable was fixed to 0. Moreover, the observed variable residual variances for like-items were allowed to covary across the measurement points in order to account for temporal stability in item specificities (Vandenberg & Lance, 2000).

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To test for metric equivalence for the first-order latent variables, we constrained the first-order latent variable factor loadings for like-items to be equivalent across time (*constrained first-order loadings model*). To test for metric equivalence for the second-order latent variables, we next constrained the second-order latent variable factor loadings for like-first-order latent variables to be equivalent across time (*constrained second-order loadings model*). We next tested for scalar equivalence for the observed first-order latent variable indicators by constraining the intercepts for like-items to be equivalent across time (*constrained observed item intercepts model*). Finally, we tested for scalar equivalence for the first-order latent variables by constraining the intercepts for the first-order latent variables to be equivalent across time (*constrained first-order factor intercepts model*).

A drop in model fit for a given set of constraints would indicate that one or more of the constrained measurement parameters is/are nonequivalent across time. As noted above, the χ^2 test for overall model fit is overly sensitive to sample size (Bollen, 1989); the same is true for model fit comparisons (Cheung & Rensvold, 2002; Little, 1997; Little, Card, Slegers, & Ledford, 2007). Moreover, minor deviations in equivalence at the level of individual measurement parameters are highly unlikely to have any substantive consequences (Little et al., 2007); that is, tests of substantive hypotheses will be unaffected by minor deviations from absolute equivalence (Vandenberg & Lance, 2000). For these reasons, we used CFI and RMSEA change values (ΔCFI and ΔRMSEA) for model fit comparisons (i.e., to determine whether adding additional constraints to a model resulted in a *substantive* drop in model fit). Following the recommendations of Cheung and Rensvold (2002) and Little et al. (2007), respectively, a model was identified as resulting in a substantive drop in model fit with a CFI *decrease* equal to or greater than .01 and a RMSEA *increase* equal to or greater than .01.

As noted above, although we found that a second-order factor structure provided better predictive utility in our analyses, the three HLS factors may be differentially associated with variables other than anxiety and/or with anxiety among other samples (see Walters, Beltran, Huh, & Evans-Campbell, 2011). We thus tested the equivalence of the factor loadings (metric equivalence) and item intercepts (scalar equivalence) for the three-factor structure across adolescence. This involved the estimation of three models with increasing levels of constraints placed on the measurement parameters (Vandenberg & Lance, 2000). For the first model, the factor loadings and intercepts for each of the latent factors were allowed to estimate separately across the waves (*unconstrained model*). For model identification, a single factor loading and item intercept for each latent variable were fixed to 1 and 0, respectively. Moreover, the observed variable residual variances for like-items were allowed to correlate across the measurement points to account for temporal stability in item specificities (Vandenberg & Lance, 2000).

To test for metric equivalence, we constrained the factor loadings for like-items to be equivalent across time (*constrained loadings model*). To test for scalar equivalence, we next constrained the item intercepts for like-items to be equivalent across time (*constrained observed intercepts model*). As with the models for the second-order factor structure, a model was identified as resulting in a substantive drop in model fit with a CFI decrease equal to or greater than .01 and a RMSEA increase equal to or greater than .01.

Finally, to be comprehensive, we tested the longitudinal metric and scalar equivalence of our anxiety measure. For these tests, we followed the same procedure outlined above for the three-factor HLS structure, but with a single-factor structure.

Hypothesis Testing

We tested our hypothesis that more frequent thoughts of HL would be associated with subsequent increases in anxiety by estimating an autoregressive cross-lagged latent variable path model (i.e., structural equation model). For this model, paths were included from HL and anxiety at a given wave to HL and anxiety at the immediately following wave. The measurement parameters for the HL and anxiety latent variables were specified according to the final longitudinal measurement model.

We first estimated models in which all of the path coefficients were allowed to estimate freely across the waves (*unconstrained model*). To examine whether there were any time-related (or developmental) differences in the magnitude of the path coefficients, we compared this unconstrained model to a model in which like-path coefficients were constrained to be equivalent across the waves (*constrained model*; e.g., HL at Wave 2 → anxiety at Wave 3, HL at Wave 3 → anxiety at Wave 5, and HL at Wave 5 → anxiety at Wave 7). Because of the direct substantive consequences involved in constraining structural parameters to be equivalent, we followed Little's (1997; see also Little et al., 2007) recommendation and compared the fit of the models using the ^{2} change test ($\Delta\chi^2$).

Results for Tests of Longitudinal Measurement Equivalence

Second-order model—Details regarding model fit and model fit comparisons for the second-order longitudinal measurement equivalence models are shown in Table 3 (second-order HLS model). As can be seen, compared with the unconstrained model, the constrained first-order loadings model did not result in a substantive drop in model fit. Similarly, compared with the constrained first-order loadings model, the constrained second-order loadings model did not result in a substantive drop in model fit. Likewise, placing constraints on the observed item intercepts did not result in a substantive drop in model fit, relative to the constrained second-order loadings model. Finally, placing constraints on the first-order latent variable intercepts did not result in a substantive drop in model fit, compared with the constrained observed item intercepts model. These results indicate that the HLS, with a second-order factor structure, holds full longitudinal metric and scalar equivalence, both for the first-order and second-order latent variables.

Three-factor model—As shown in Table 3 (three-factor HLS structure), constraining the factor loadings to be equivalent across time did not result in a substantive drop in model fit relative to the unconstrained model. Similarly, constraining the item intercepts to be equivalent across time did not result in a substantive drop in model fit, relative to the constrained loadings model. Thus, as with the second-order structure, the three-factor structure demonstrated full longitudinal metric and scalar equivalence.

Anxiety—As shown in Table 3 (anxiety model), the constrained loadings model did not result in a substantive drop in model fit relative to the unconstrained model. Constraining the

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observed item intercepts, however, resulted in a substantive drop in model fit, as indicated by a CFI drop of .01. Examination of the LaGrange Multiplier values (modification indices in Mplus) suggested that this was attributable to the item “Are you anxious?” at Wave 2. A subsequent model in which this single parameter was allowed to estimate freely (*partially constrained item intercepts model*) did not result in a substantive drop in model fit, relative to the constrained loadings model. For our latent variable path model, then, we allowed this single item intercept to estimate freely, while constraining the remaining measurement parameters to be equal across the waves.

Results for Hypothesis Testing

As shown in Table 3 (latent variable path model), the unconstrained latent variable path model provided a subpar fit to the data based on the CFI value. Importantly, however, Kenny (2014) has shown that CFI values are problematic for evaluating overall model fit when the average interitem correlation is low. As a general rule of thumb, Kenny suggested that CFI values should not be considered if the RMSEA value for a null model (i.e., only item intercepts and variances estimated) is less than .158. The null model for the items included in our final analyses resulted in a RMSEA of .119. For this reason, we relied on the RMSEA and SRMR values to evaluate the overall fit of the model, both of which suggested that the model provided a good fit to the data. We thus proceeded with our analyses.

Constraining the like-path coefficients to be equivalent across the waves did not result in a significant drop in model fit, as indicated by the nonsignificant $\Delta\chi^2$ test reported in Table 3. The standardized path coefficients for our final model are reported in Figure 3. As predicted, across all measurement points, more frequent thoughts of HL were associated with subsequent increases in anxiety. In addition, as would be expected, the autoregressive paths all were positive and statistically significant. Finally, anxiety was not significantly associated with subsequent changes in HL.

Discussion

The goal of this study was to evaluate the longitudinal measurement properties of the Historical Loss Scale (HLS; Whitbeck et al., 2004) among Indigenous adolescents and to test the hypothesis that more frequent thoughts about historical loss, which has been conceptualized as a stressor (Walls & Whitbeck, 2012), would be associated with subsequent increases in anxiety. In contrast to the originally identified single-factor structure of the HLS, our preliminary analyses suggested that the responses to the HLS among our adolescent sample were better explained by a three-factor structure, composed of latent variables representing general cultural loss, loss of people, and cultural mistreatment. We also found that a second-order historical loss latent variable, composed of the three first-order latent variables, was of greater utility than the three separate latent factors in predicting anxiety for our sample (cf. below). Importantly, preliminary analyses of the data collected from the adult caretakers in our study suggest the same factor structure (Armenta & Whitbeck, 2015).

Focusing on second-order factor structure, our results showed that the HLS held full metric (i.e., equivalent factor loadings) and scalar (i.e., equivalent intercepts) equivalence from

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early to late adolescence. This was the case for both the first- and second-order measurement parameters. To be comprehensive, we also evaluated the longitudinal measurement equivalence for the three-factor structure. Similar to the results for the second-order structure, the three-factor HLS model held full metric and scalar equivalence. Moreover, our measure of anxiety (Oetting et al., 1989; Swaim et al., 1989) held full longitudinal metric equivalence and partial longitudinal scalar equivalence. Importantly, for anxiety, only one item intercept showed to be nonequivalent, which does not raise any critical concerns (Vandenberg & Lance, 2000), especially given that we accounted for this nonequivalence in our final analyses.

Finally, our results supported our hypothesis that more frequent thoughts about HL, as assessed with the HLS, would lead to subsequent increases in anxiety. In summary, then, our results (a) indicate that the HLS held equivalent measurement properties from early to late adolescence among our sample, thus allowing for unbiased and consequently comparable estimates of covariance parameters (e.g., correlations, regression coefficients) throughout this developmental period, as well as unbiased estimates of developmental differences in HL (i.e., changes in mean HL levels), and, in significantly predicting anxiety, (b) provide support for the conceptualization of frequency of thoughts regarding HL as a stressor (Walls & Whitbeck, 2012).

We find it important to note that, although we found that a second-order HLS factor provided greater predictive utility in terms of subsequent changes in anxiety among our sample, this may not be the case for all outcome variables and/or for anxiety among other samples. For example, Walters, Mohammed and their colleagues (2011) reported preliminary results from a study indicating that "[historical trauma] events that *disrupt ties* to family, community, or place (e.g., boarding school, forced relocation) may be associated with depressive symptoms, whereas [historical trauma] events that cause *direct physical harm* to community, body, land, or sacred sites are more likely to be associated with anxiety and PTSD symptoms" (p. 183; Walters, Beltran, et al., 2011; italics in original). In our analyses, we did not find differences using scores derived from the items reflecting the three factors that we identified. Nonetheless, given the results reported by Walters and her colleagues, we strongly encourage scholars who examine the correlates of HL to consider overall HLS scores as well as HLS subscale scores (based on the three factors we identified) in their analyses.

Our study is not without limitations, two of which we believe are particularly important for future studies. First, our study included adolescents from a single Indigenous cultural group living on or near their cultural group's reservation/reserve (located in the upper Mid-western U.S. and Canada). As such, whether or not the HLS functions similarly among Indigenous adolescents from other cultural groups, and Indigenous adolescents who do not live on or in immediate proximity to their cultural group's reservation/reserve, remains to be seen. We should note, however, that we were able to obtain data from approximately 80% of our target population (i.e., Tribally enrolled children who were between the ages of 10 and 12 and living on or proximate to their cultural group's reservation/reserve). This provides us with high confidence that our results are generalizable to the population from which our sample was drawn.

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A second limitation, which is perhaps better framed as an important direction for future research, is that the HLS inquires about the frequency with which an individual thinks about cultural loss, but does not obtain information regarding how those thoughts are being appraised. This issue is similar to some measures of stressful life events for which individuals are asked to indicate the *potentially* stressful events that they have experienced. As with measures of stressful life events, we can reasonably assume that the degree of self-reported thoughts of historical loss are strongly correlated with stress appraisals. Nonetheless, adding an appraisal component to the HLS may provide more nuanced details regarding the negative psychosocial consequences associated with thoughts regarding HL. Notably, such a measure was developed along with the HLS; specifically, the Historical Loss Associated Symptoms Scale (Whitbeck et al., 2004). In the development of the present study, however, this measure was not deemed to be appropriate for administration to children, and was thus only administered at Waves 7 of the study. Preliminary cross-sectional analyses of our Wave 7 data (Armenta & Whitbeck, 2014) suggest that appraisals of HL may indeed be a fruitful avenue for future research.

Despite these limitations, our results provide important initial evidence for the measurement validity and predictive utility of the HLS for Indigenous adolescents. Historical trauma is a highly salient construct within the Indigenous literature (focusing on Indigenous peoples around the world), among clinicians and other practitioners who work with Indigenous populations, and among members of Indigenous communities. Much of the scholarly work to date, however, has been qualitative, conceptual, and/or theoretical. This work has been critical in laying the foundations for thinking about and understanding historical trauma. The HLS provides a means of quantitatively considering one ostensible contributor to the contemporary experiences with historical trauma. In addition to the suggestions offered (and alluded to) above, we encourage scholars to develop additional standardized measures to assess other important contributions to, and aspects of, the historical trauma experience.

There are two additional implications of our study that should be noted. First, although the HLS assesses the frequency with which North American Indigenous individuals think about the losses to their culture, people, and land as a result of European colonization, the experience of historical trauma and historical loss are not limited to Indigenous individuals. Indeed, many of the earliest writings on historical trauma among Indigenous populations drew heavily on literature focusing on historical trauma among Jewish individuals who had survived the 1940s Jewish Holocaust, as well as the descendants of those survivors (e.g., Brave Heart & De-Bruyn, 1998; Whitbeck et al., 2004). Scholars also have discussed historical trauma among Japanese individuals as a result of the forced internment during World War II (Nagata & Cheng, 2003; Nagata & Takeshita, 2002), Black/African American individuals as a result of slavery and a long history of societal devaluation (Williams-Washington, 2010), and Mexican and Mexican Ameri-can individuals as a result of Spanish colonization and a history of maltreatment by the U.S. government (Estrada, 2009). Our results, along with the burgeoning literature on historical trauma among Indigenous populations (e.g., Brave Heart, Chase, Elkins, & Altschul, 2011; Prussing, 2014; Walls & Whitbeck, 2012; Walters, Mohammed, et al., 2011), may be useful in further thinking about negative contemporary experiences resulting from historically rooted events among these other ethnic, cultural, and racial minority groups. Moreover, the HLS may prove to be useful in guiding the development of standardized assessments to assess one aspect of historical trauma (i.e., thoughts about historical loss) that may be experienced by members of these groups.

Second, conceptualizing thoughts regarding historical loss, as assessed by the HLS, as a stressor (Walls & Whitbeck, 2012) allows scholars to draw on a rich body of sociological (e.g., Pearlin, 1989; Pearlin & Bierman, 2013) and psychological (e.g., Contrada & Baum, 2011; Lazarus & Folkman, 1984; Zeidner & Endler, 1996) literature on stress, the stress process, and coping mechanisms in formulating and testing hypotheses. For example, the stress and coping literature provides empirically derived details regarding individual differences (e.g., coping styles) that may buffer the negative psychosocial consequences associated with exposure to stressful life events. In this way, the existing literature on stress and stress-related processes may help to more quickly expand our current understanding regarding the role of historical loss in the lives of Indigenous individuals.

Acknowledgments

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Appendix A: Historical Loss Scale

Our people have experienced many losses since we came into contact with Europeans (Whites). I will read you types of losses that people have mentioned to us, and I would like you to tell how often you think of these.

1	2	3	4	5	6
Several times a day	**Daily**	**Weekly**	**Monthly**	**Yearly or only at special times**	**Never**
1. The loss of our land					
2. The loss of our language					
3. Losing our traditional spiritual ways					
4. Losing our culture					
5. The losses from the effects of alcoholism on our people					
6. Loss of our people through early death					
7. Loss of respect by our children and grandchildren for elders					
8. Loss of respect by our children for traditional ways					
9. The loss of our family ties because of boarding/residential schools					
10. The loss of families from the reservation/reserve to government relocation					
11. The loss of self-respect from poor treatment by government officials					
12. The loss of trust in whites from broken treaties					

Note: The items 12 items listed represent the adult version of the Historical Loss Scale. The two italicized items are omitted for the adolescent version of the Scale. The items are listed in order of the three categories used in this manuscript. We strongly recommend listing the items randomly when administered to participants. All items should be reverse-coded.

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Appendix B

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Standardized Factor Loadings for Within Wave and Longitudinal Confirmatory Factor Models (Wave 2/Wave 3/Wave 5/Wave 7)

	Confirmatory Factor Model							
	One factor	Three factors			Three factors with second-order factor			
	Factor 1	*Factor 1*	*Factor 2*	*Factor 3*	*Factor 1*	*Factor 2*	*Factor 3*	*Second-order*
Within Wave Models								
Item 1	.62/.82/.77/.81	.68/.82/.79/.83	–	–	.68/.82/.79/.83	–	–	–
Item 2	.63/.83/.86/.87	.69/.86/.92/.91	–	–	.69/.86/.92/.91	–	–	–
Item 3	.75/.84/.75/.87	.81/.87/.90/.91	–	–	.81/.87/.90/.91	–	–	–
Item 4	.78/.84/.87/.90	.82/.86/.87/.88	–	–	.82/.86/.87/.88	–	–	–
Item 5	.75/.78/.80/.84	–	.89/.86/.88/.92	–	–	.89/.86/.88/.92	–	–
Item 6	.72/.79/.73/.80	–	.84/.86/.81/.87	–	–	.84/.86/.81/.87	–	–
Item 9	.67/.74/.73/.70	–	–	.70/.79/.79/.78	–	–	.70/.79/.79/.78	–
Item 10	.93/.80/.74/.69	–	–	.82/.87/.86/.81	–	–	.82/.87/.86/.81	–
Item 11	.77/.75/.78/.74	–	–	.87/.81/.88/.85	–	–	.87/.81/.88/.85	–
Item 12	.76/.81/.80/.75	–	–	.81/.83/.84/.86	–	–	.81/.83/.84/.86	–
Factor 1	–	–	–	–	–	–	–	.94/.96/.92/.93
Factor 2	–	–	–	–	–	–	–	.85/.91/.93/.94
Factor 3	–	–	–	–	–	–	–	.81/.90/.85/.84
Longitudinal Models								
Item 1	.63/.82/.77/.80	.68/.82/.79/.83	–	–	.68/.82/.79/.83	–	–	–
Item 2	.63/.83/.86/.86	.69/.85/.91/.91	–	–	.69/.85/.91/.91	–	–	–
Item 3	.75/.84/.85/.87	.81/.86/.90/.91	–	–	.81/.86/.90/.91	–	–	–
Item 4	.77/.85/.87/.90	.81/.86/.87/.89	–	–	.81/.86/.87/.89	–	–	–
Item 5	.74/.78/.80/.84	–	.88/.86/.88/.92	–	–	.88/.86/.88/.92	–	–
Item 6	.70/.79/.74/.80	–	.85/.86/.80/.87	–	–	.85/.86/.80/.87	–	–
Item 9	.67/.74/.73/.70	–	–	.69/.79/.97/.78	–	–	.69/.79/.97/.78	–
Item 10	.75/.80/.73/.70	–	–	.81/.87/.86/.81	–	–	.81/.87/.86/.81	–
Item 11	.77/.75/.77/.74	–	–	.85/.81/.88/.85	–	–	.85/.81/.88/.85	–
Item 12	.77/.81/.79/.76	–	–	.82/.83/.84/.86	–	–	.82/.83/.84/.86	–
Factor 1	–	–	–	–	–	–	–	.94/.97/.92/.94
Factor 2	–	–	–	–	–	–	–	.84/.91/.94/.93

	Confirmatory Factor Model							
	One factor	**Three factors**			**Three factors with second-order factor**			
	Factor 1	***Factor 1***	***Factor 2***	***Factor 3***	***Factor 1***	***Factor 2***	***Factor 3***	***Second-order***
Factor 3	–	–	–	–	–	–	–	.83/.90/.84/.84

Appendix C

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Zero-order Correlations for Three-factor Latent Variable Models (within-wave and longitudinal)

	Wave 2			Wave 3			Wave 5			Wave 7		
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3
Wave 2												
Factor 1	-	**.80**	**.77**	-	-	-	-	-	-	-	-	-
Factor 2	**.79**	-	**.69**	-	-	-	-	-	-	-	-	-
Factor 3	**.76**	**.68**	-	-	-	-	-	-	-	-	-	-
Wave 3												
Factor 1	.34	.27	.38	-	**.88**	**.87**	-	-	-	-	-	-
Factor 2	.38	.39	.50	**.88**	-	**.82**	-	-	-	-	-	-
Factor 3	.19	.15	.42	**.87**	**.82**	-	-	-	-	-	-	-
Wave 5												
Factor 1	.36	.29	.33	.45	.38	.36	-	**.85**	**.78**	-	-	-
Factor 2	.28	.33	.28	.40	.36	.33	**.85**	-	**.79**	-	-	-
Factor 3	.25	.15	.33	.33	.26	.32	**.78**	**.79**	-	-	-	-
Wave 7												
Factor 1	.30	.21	.13	.40	.41	.28	.53	.54	.36	-	**.87**	**.78**
Factor 2	.26	.21	.17	.41	.42	.30	.43	.53	.32	**.87**	-	**.79**
Factor 3	.21	.15	.23	.36	.35	.31	.40	.45	.37	**.78**	**.79**	-

Note: Factor 1 = cultural loss; Factor 2 = loss of people; Factor 3 = cultural mistreatment; Correlations below the diagonal are for the three-factor longitudinal confirmatory factor model; correlations above the diagonal are for the three-factor within-wave confirmatory factor models; within-wave inter-factor correlations are bold for ease of identification; correlations equal to or less than .15 are not statistically significant at $p \leq .05$; correlations between .16 and .21 are statistically significant at $p \leq .05$; correlations equal to or greater than .22 are statistically significant at $p \leq .01$.

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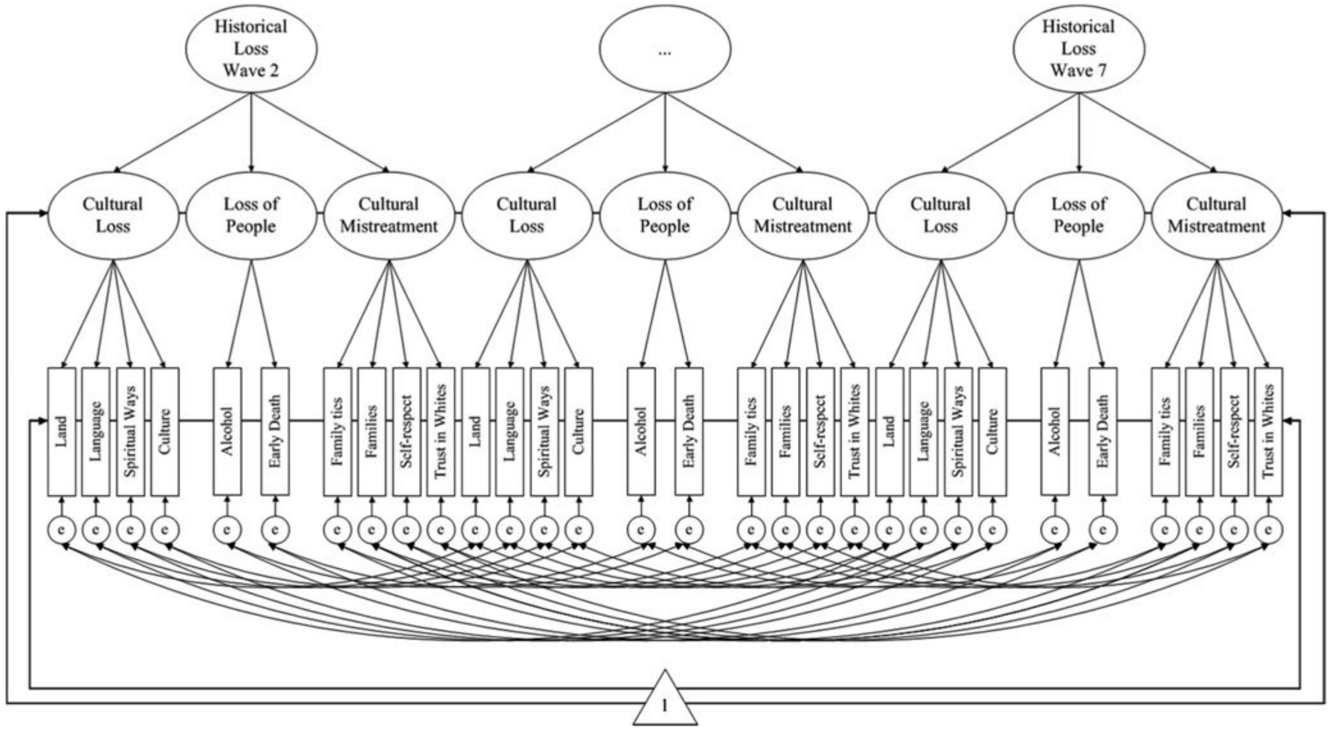

Figure 1.
Second-order longitudinal measurement model. Straight lines represent measurement parameters; ovals represent latent factors; circles represent error variances; rectangles represent observed variables; triangle represents intercepts; intercept parameters are summarized with a line cutting through the variables to reduce visual clutter; and curved lines represent error covariances. The figure includes only those measurement parameters that were tested for longitudinal measurement equivalence to reduce visual clutter.

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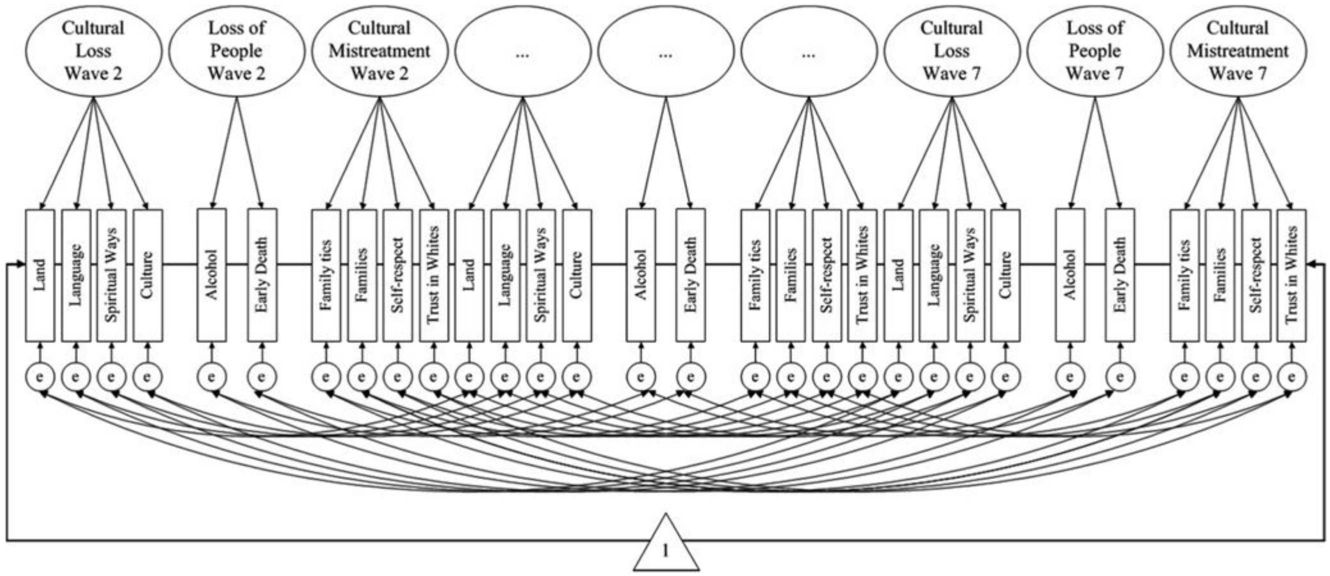

Figure 2.

Three-factor longitudinal measurement model. Straight lines represent measurement parameters; ovals represent latent factors; circles represent error variances; rectangles represent observed variables; triangle represents intercepts; intercept parameters are summarized with a line cutting through the variables to reduce visual clutter; and curved lines represent error covariances. The figure includes only those measurement parameters that were tested for longitudinal measurement equivalence to reduce visual clutter.

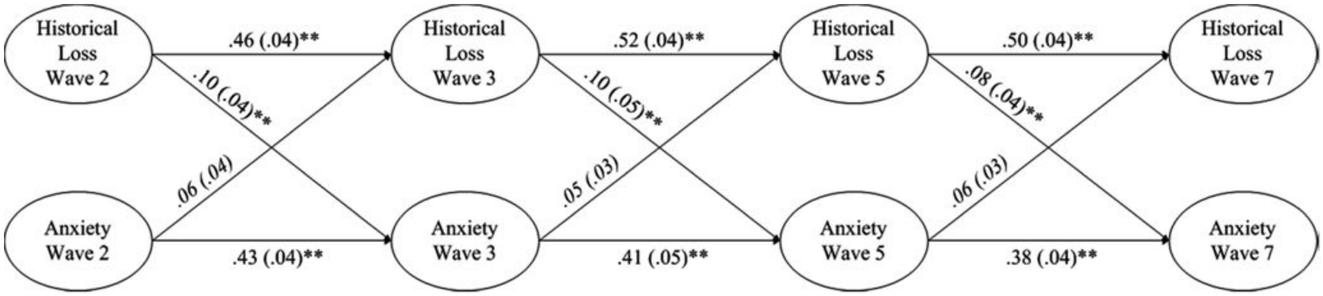

Figure 3.

Results for final latent variable autoregressive cross-lagged path model. **$p \leq .01$. Standardized coefficients and standard errors (in parentheses) are reported; ovals represent latent factors (first-order latent factors for anxiety and second-order latent factors for historical loss); only path coefficients and standard errors are reported to reduce visual clutter (estimates for the remaining model parameters are available upon request from the first author).

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Table 1

Descriptive Statistics and Zero-Order Correlations

	Historical loss				Anxiety			
Variable	**Wave 2**	**Wave 3**	**Wave 5**	**Wave 7**	**Wave 2**	**Wave 3**	**Wave 5**	**Wave 7**
Historical loss								
Wave 2	—							
Wave 3	.35**	—						
Wave 5	.31**	.39**	—					
Wave 7	.18*	.37**	.48**	—				
Anxiety								
Wave 2	.24**	.19**	.09*	.06	—			
Wave 3	.25**	.22**	.09*	.12**	.36**	—		
Wave 5	.04	.09†	.23**	.17**	.21**	.29**	—	
Wave 7	−.01	.15**	.14**	.22**	.18**	.28**	.38**	—
Demographics								
Gender	.05	−.08	−.05	−.06	−.01	.04	.05	.04
Age	−.03	.01	.01	.02	−.01	−.02	−.01	−.06
Descriptives								
Mean	1.11	1.23	1.14	1.26	2.14	2.17	2.01	1.60
Standard deviation	1.29	1.31	1.16	1.16	.44	.43	.43	.49
Coefficient alpha	.92	.95	.94	.95	.68	.70	.74	.79
Skewness	.65	.56	.74	.59	−.17	−.11	−.09	.19
Kurtosis	−.23	−.62	−.23	−.49	−.13	.11	.01	−.38

† $p \le .10$.

* $p \le .05$.

** $p \le .01$.

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Table 2

Model Fit for One-Factor, Three-Factor, and Second-Order Confirmatory Factor Models

Model	χ^2	*df*	CFI	RMSEA	SRMR
One-factor model					
Wave 2	110.44	35	.852	.110	.069
Wave 3	145.15	35	.923	.086	.044
Wave 5	367.21	35	.846	.126	.061
Wave 7	332.61	35	.863	.123	.064
Longitudinal	2170.04	674	.861	.059	.064
Three-factor model					
Wave 2	48.21	32	.968	.054	.039
Wave 3	68.12	32	.975	.052	.029
Wave 5	130.59	32	.954	.072	.034
Wave 7	102.58	32	.968	.062	.030
Longitudinal	1086.55	614	.956	.035	.047
Second-order model					
Wave 2	48.21	32	.968	.054	.039
Wave 3	68.12	32	.975	.052	.029
Wave 5	130.59	32	.954	.072	.034
Wave 7	102.58	32	.968	.062	.030
Longitudinal	1216.33	662	.948	.036	.060

Note. χ^2 = χ-square; *df* = degrees of freedom; CFI = comparative fit index; RMSEA = root mean squared error of approximation; SRMR = standardized root mean error residual.

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Table 3

Model Fit and Model Fit Comparisons for Tests of Longitudinal Measurement Equivalence

Model	χ^2	***df***	**CFI**	**RMSEA**	**SRMR**	**Comparison**	**ΔCFI**	**ΔRMSEA**
Second-order HLS model								
1. Unconstrained	1216.33	662	.948	.036	.060	—	—	—
2. Constrained first-order loadings	1248.98	683	.947	.036	.060	2 vs. 1	−.001	.000
3. Constrained second-order loadings	1260.70	689	.947	.036	.062	3 vs. 2	.000	.000
4. Constrained observed item intercepts	1322.72	710	.943	.037	.062	4 vs. 3	−.004	.001
5. Constrained first-order factor intercepts	1349.37	716	.941	.037	.062	5 vs. 4	−.002	.000
Three-factor HLS model								
1. Unconstrained	1086.55	614	.956	.035	.047	—	—	—
2. Constrained factor loadings	1118.82	635	.955	.034	.048	2 vs. 1	−.001	−.001
3. Constrained observed item intercepts	1180.28	656	.951	.035	.048	3 vs. 2	.001	.000
Anxiety model								
1. Unconstrained	100.53	74	.987	.023	.033	—	—	—
2. Constrained factor loadings	112.54	83	.986	.023	.037	2 vs. 1	−.001	.000
3. Constrained observed item intercepts	140.91	92	.976	.028	.042	3 vs. 2	−.010	.005
4. Partially constrained item intercepts	130.81	91	.981	.026	.041	4 vs. 2	−.005	.003
Latent variable path model								
1. Unconstrained	2614.52	1451	.919	.035	.076	—	—	—
2. Constrained path coefficients	2625.49	1459	.919	.035	.076	2 vs. 1	$\Delta\chi^2(8) = 10.97^{ns}$	

Note. χ^2 = χ-square; *df* = degrees of freedom; CFI = comparative fit index; RMSEA = root mean squared error of approximation; SRMR = standardized root mean error residual; Comparison = models compared; Δ = change.