

Psychometric Evaluation of the Parental Monitoring Short Scale (PMSS)

Randall C. Swaim (✉ randall.swaim@colostate.edu)

Colorado State University <https://orcid.org/0000-0003-1436-5644>

Linda R. Stanley

Colorado State University

Research Article

Keywords: parental monitoring, psychometrics, measurement invariance, validity, American Indian

Posted Date: April 21st, 2022

DOI: <https://doi.org/10.21203/rs.3.rs-1416521/v1>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

This study evaluated the psychometric properties and validity of the Parental Monitoring Short Scale (PMSS) across reservation-based American Indian and White youth. The PMSS is a shortened and revised version of previous measures of Parental Knowledge, Parental Control, Child Disclosure, and Parental Solicitation. EFA and CFA supported three factors, with Child Disclosure and Parental Solicitation forming a single factor. Configural, scale, and metric invariance were supported across grade level, sex, and ethnicity. Additionally, scale factors were negatively related to substance use, supporting its validity as reported in previous research. This shortened scale of parental monitoring with simplified language can provide a useful measure to comprehensively assess parental monitoring across various subgroups of youth. Further work with this scale among other ethnic groups will determine the breadth of its utility.

Introduction

Parental monitoring is an effective source of prevention against adolescent conduct problems including substance use (Lac & Crano, 2009; Racz & McMahon, 2011). Early formulations of this measure focused on parental knowledge (PK) of child activities and whereabouts when not directly under parental supervision (Dishion & Loeber, 1985). Subsequent work in this area (Kerr & Stattin, 2000; Stattin & Kerr, 2000) includes more active behaviors of both parents and children. These include parental limit setting on child behaviors (parental control, PC), parental pursuit of child behavior information (parental solicitation, PS), and voluntary child report to parents of their behaviors (child disclosure, CD).

Stattin and Kerr argue that previously described “parental monitoring” was limited to PK, whereas the new measures of PC, PS, and CD are needed to more accurately assess the full range of sources of parental knowledge and control. They evaluated the psychometric properties of five items each from a new measure that included PC, PS, and CD, finding support for factor structure and reliability. Additionally, they found support for expected correlational relationships to measures of adolescent adjustment (e.g., delinquency, substance use, internal maladjustment, school problems). They further showed that CD better explained how parents obtain knowledge of their child’s behaviors than PS or PC, and that CD was a better predictor of child adjustment (Kerr & Stattin, 2000).

While their initial work was based on a cross-sectional sample, these relationships were upheld in a longitudinal study (Kerr, Stattin, & Burk, 2010). Also, an informative review by Racz and McMahon (2011) of follow-up findings indicated some outcomes that differed from those of Stattin and Kerr. For example, in a longitudinal study, Fletcher, Steinberg, and Williams-Wheeler (2004) found that PC directly affected adolescent problem behavior and substance use. While Stattin and Kerr (2000) found that CD was the better predictor of child misbehavior, and that the more active components of surveillance and tracking of child behaviors may not be as productive as child disclosure, Laird, Marrero, and Sentse (2010) found that active PS may be effective for youth who are less supervised by their parents. These and other findings underscore the complex nature of the parental monitoring construct.

Stattin and Kerr’s work clearly advanced our understanding of how parental information about child behaviors is obtained along with its impact on child adjustment and problem behavior. One drawback to their work, however, is the length of their measures. With five items each measuring PC, PS, and CD, with an additional nine items to capture PK, the resulting 24-item overall measure may limit how many other measures could be included in a comprehensive survey, especially for those who assess children and adolescents in a single class period at school. An additional concern is the readability of the items. They tend to be an average of 19 words per sentence, and some are compound in structure. This may restrict the applicability of these measures to younger students and those with less reading ability.

To address these concerns, we developed an abbreviated 12-item scale (Parental Monitoring Short Scale; PMSS) to assess each of the measures assessed by Stattin and Kerr, along with PK. We shortened and simplified language while attempting to maintain their content and purpose. The original items and the revised and shortened number of items on the PMSS are presented in Table 1. The PK items were kept in their original form. We evaluated the readability of both sets of items. The Flesch-Kincaid Grade Level index was 9.51 and 2.66 for the Stattin and Kerr and PMSS items, respectively. The SMOG index, an indication of years of education needed to comprehend 90–100% of the content, was 9.02 and 5.15 for the Stattin and Kerr and PMSS items respectively.

Table 1
Original and Revised Parental Monitoring Items

| Original Items | PMSS Revised Items |
|--|--|
| Parental Knowledge | |
| 1. My parents know where I am after school. 2. When I go out at night, my parents know who I am with. 3. When I go out at night, my parents know where I am. | 1. My parents know where I am after school. 2. When I go out at night, my parents know who I am with. 3. When I go out at night, my parents know where I am. |
| Parental Control | |
| 1. Must you have your parents' permission before you go out during the weeknights? 2. If you go out on a Saturday evening, must you inform your parents beforehand about who will be along as well as where you will be going? 3. If you have been out past curfew, do your parents require that you explain why and tell who you were with? 4. Do your parents demand that they know where you are going to be with, and what you are going to do? 5. Must you ask your parents before you can make plans with friends about what you will do on a Saturday night? 6. Do your parents require that you tell them how you spend your money? | 1. I need permission to be out late on weeknights. 2. I have to tell my parents who I'm with and what I'm doing at night with friends. 3. I have to tell my parents my plans for weekend nights. |
| Parental Solicitation | |
| 1. How often do your parents talk with your friends when they come over to your house? 2. How often do your parents ask you about what happened during your free time? 3. During the past month, how often have your parents initiated a conversation with you about your free time? 4. When did your parents last have extra time to sit down and listen to you when you talk about what happened during your free time? 5. How often do your parents ask you to sit and tell them what happened at school on a regular school day? | 1. My parents talk to my friends. 2. My parents ask me what I do in my free time. 3. My parents ask about things that happen at school. |
| Child Disclosure | |
| 1. Do you spontaneously tell your parents about your friends (which friends you hang out with and how they think and feel about various things)? 2. How often do you usually want to tell your parents about school (how each subject is going; your relationship with teachers)? 3. Do you keep a lot of secrets from your parents about what you do during your free time? 4. Do you hide a lot from your parents about what you did and where you went in the evening? 5. Do you like to tell your parents about what you did and where you went during the evening? | 1. I tell my parents about my activities with friends. 2. I tell my parents how I'm doing in school 3. I keep secrets from my parents about what I do in my free time. |

The current study assesses the psychometric characteristics of the PMSS. The data are from an ongoing population-based study of substance use among American Indian adolescents who attended 41 schools on reservations, along with White students who attended the same schools. Several studies have examined how PK operates best in ethnic minority populations. Among a sample of urban African American youth, Tebes et al. (2011) reported that higher levels of parental knowledge were associated with less substance use. In a longitudinal study among youth of Mexican heritage, Nagoshi, Marsiglia, Parsai, and Castro (2011) found an interaction with cultural identification in which PK decreased the likelihood of alcohol use among boys low on cultural identification and girls high on cultural identification.

Unfortunately, there is little research to date addressing the parental monitoring components of PC, PS, and CD in ethnic minority populations of youth. In addition, considerable research describes differing patterns of parenting behaviors among various ethnic groups (Garcia Coll, Meyer, & Brillion, 1995; Parke & Buriel, 1998) that may impact how parental monitoring operates in these family groups. For example, in African American and Latino families, high levels of parental control are judged to be evidence of appropriate and effective parenting (Elder, Eccles, & Lord, 1995). These families may also tend to expect obedience and respect for elders, perhaps at higher levels than their European-American family counterparts (Garcia Coll et al., 1995).

American Indian (AI) families are no exception regarding differing expectations parents hold for their children. However, findings on parenting style in AI families is limited, with some reports at odds with one another. The principle of non-interference and the belief that children are responsible for their own choices and behaviors is prominent across various AI tribal groups (Robinson-Zañartu, 1996). Autonomy and self-regulation were found to be valued among Navajo parents (Frankland, Turnbull, Wehmeyer, & Blackmountain (2004). Additionally, parental support is sometimes emphasized over strict discipline, which can be seen more as the role of extended family members (Mmari, Blum, & Teufel-Shone, 2010; Walls, Whitesell, Barlow, & Sarche, 2019). These characteristics of AI parenting behaviors would appear to run counter to active PC. In contrast, Abraham, Christopherson, and Kuehl (1984) found a punishing and protective parental style to be common among Navajo parents.

These studies raise questions as to whether the newer formulation of parental monitoring that includes PC, CD, and PS is measured similarly across AI and non-AI populations. It is often risky to apply measures to ethnic-minority populations that were developed and tested for their psychometric characteristics in majority populations. Parental monitoring is an important and effective means to prevent and forestall adolescent misbehaviors. But the newer formulation of this measure (Stattin & Kerr, 2000; Kerr & Stattin, 2000) should be carefully assessed for its appropriateness in AI families.

The current study assesses the PMSS across AI and White middle and high school students. We evaluate the psychometric characteristics of the scale including factor structure and measurement invariance, internal consistency, and relationship to substance use as an indicator of predictive validity.

Methods

Participants and Procedure

The data for this study are from an ongoing investigation of the epidemiology and etiology of substance use among American Indian (AI) students who attend schools on or near reservations. Each year a random sample of schools on or within 25 miles of a recognized reservation is obtained, and all students in grades 7–12 whose parents have not opted them out complete the Our Youth, Our Future survey (OYOF). The OYOF sampling frame was built from three primary sources - the NCES Common Core of Data (CCD), the NCES Private School Universe Survey (PPS), and the Bureau of Indian Education (BIE) National Directory. Only schools with grade 7 were included in the sampling frame as the high school fed by each sampled middle school was included in the final sample. Criteria used for searching CCD and PPS were: 1) at least 20% AI enrollment and 2) a total enrollment of at least 20 students. Schools from Alaska and Hawaii were excluded. This list was then further refined by including only schools on or within 25 miles of an AI reservation. These same criteria were used for BIE schools. Where enrollment numbers were not available, schools were contacted for this information. In the final sampling frame, only schools with an average enrollment by grade (for grades 7 and above) of 20 students were included. Students complete the online, anonymous OYOF survey using Qualtrics software within a single class period. They are informed that they can decline to participate or not respond to any question they do not wish to answer.

The study uses data from 41 schools surveyed during the 2018 and 2019 school years. The sample consists of 4576 7th – 12th grade students (48.7% female; 1615 7-8th AI; 2058 9-12th AI; 335 7-8th white; 568 9-12th white), self-identifying as AI or white.

Measures

Thirteen revised and shortened items were used to capture the different dimensions of parental monitoring as described by Dishion and Loeber (1985) and Stattin and Kerr (2000). Four items capturing PK were from Dishion and Loeber (1985) and have been used extensively in studies of AI youth (see for example, Andreescu, 2019; Boyd-Ball, Véronneau, Dishion, & Kavanagh, 2014; Swaim & Stanley, 2016). Nine items capturing PC, CD, and PS were modified from Stattin and Kerr (2000). All items were measured on a five-point Likert scale (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Most of the Time, 5 = Always).

Three substance use measures served as validity indicators for the four PMSS subscales including alcohol use, drunkenness, and marijuana use in the last month. These items were scaled as 1 = 0, 2 = 1–2 times, 3 = 3–5 times, 4 = 6–9 times, 5 = 10–19 times, 6 = 20–39 times, 7 = 40 or more times.

Data Analysis

All analyses were conducted with Mplus (Version 8.5; Múthen & Múthen, 1998–2020), using the complex statement to account for the non-independence of observations due to cluster sampling (students within schools). Consistent with measurement research (Anderson & Gerbing, 1988), we randomly divided the full sample into two approximately equal groups – the exploratory sample (ES; $n = 2316$; female = 48.4%; mean grade = 9.2) and the confirmatory sample (CS; $n = 2260$; female = 49.9%; mean grade = 9.1). Exploratory factor analysis (EFA) using robust maximum likelihood estimation was used to estimate the factor structure of the 13 items using the ES. A succession of one to four factors was extracted using Geomin rotation. Fit for models was evaluated using Root Mean Square Error of Approximation (RMSEA; good fit < .06), the Comparative Fit Index (CFI; good fit $\geq .95$), and Standardized Root Mean Square Residual (SRMR; good fit < .08) (Satorra & Bentler, 2001).

Once the factor structure was determined with EFA, confirmatory factor analysis (CFA) was used to test the obtained factor structure using the CS data and the fit indices described. Configural, scalar and metric invariance (configuration, equality of unstandardized factor loadings, and equality of factor loadings and intercepts, respectively) across sex, ethnicity, and grade group (7–8 grades and 9–12 grades) were tested using the “Model Configural Scalar Metric” analysis command in Mplus, which uses a Chi-square difference test using scaling correction factors. In addition, recommendations by Chen (2007) for acceptable changes in fit statistics ($\Delta\text{CFI} < 0.01$, $\Delta\text{RMSEA} < 0.015$, $\Delta\text{SRMR} < 0.03$) were used to supplement assessment of fit. Finally, the full data set was used to calculate Cronbach’s alpha reliabilities, compare PMSS latent means between the subgroups, and calculate correlations between the latent means and substance use measures.

Results

Exploratory Factor Analyses

Initial analyses indicated that the item, “I keep secrets from my parents about what I do in my free time,” had loadings below .17 in all models. It was removed from subsequent analyses. The one-factor model was unsatisfactory (CFI = .77; RMSEA = .14; SRMR = .08). Each subsequent model (2 thru 4 factors) improved on the previous model with good fit (2-Factor: CFI = .95; RMSEA = .07; SRMR = .03; 3-Factor: CFI = .98; RMSEA = .05; SRMR = .02; 4-Factor: CFI = .99; RMSEA = .04; SRMR = .02). While fit indices for the four-factor model indicated good fit, none of the factor 4 loadings exceeded .30. Therefore, it was rejected. The Satorra-Bentler scaled Chi-square difference test (Satorra & Bentler, 2001) indicated that the three-factor model provided improved fit over the two-factor model ($\chi^2(11) = 262.84$, $p < .001$).

Factor loadings for the EFA three-factor model are presented in Table 2. Note that two items under parental control load at .30 or above for both factor two and factor three. Because Kerr and Stattin (2000) used these items to measure parental control, for the CFA analysis, we categorized them under parental control. In addition, note that the child disclosure and parent solicitation items loaded on one factor, contrary to two factors suggested by Stattin and Kerr (2000).

Table 2
Revised PMSS Items and 3-Factor EFA and CFA Factor Loadings by Scale

| Measure | EFA Factor Loadings | | | CFA Factor Loadings | | |
|--|---------------------|-------------|-------------|---------------------|------|------|
| | F1 | F2 | F3 | F1 | F2 | F3 |
| Parental Knowledge | | | | | | |
| My parents know where I am after school. | .67* | .08* | .09* | .75* | | |
| When I go out at night, my parents know who I am with. | .91* | – .00 | .01 | .94* | | |
| When I go out at night, my parents know where I am. | .97* | – .01 | .02 | .93* | | |
| Parental Control | | | | | | |
| When I go out on weekend nights, I have to be home by a set time. | .26* | – .01 | .55* | | .64* | |
| I have to tell my parents who I'm with and what I'm doing at night with friends. | .14* | .35* | .45* | | .83* | |
| I have to tell my parents my plans for weekend nights. | – .00 | .57* | .30* | | .82* | |
| I need permission to be out late on weeknights. | – .01 | .08 | .80* | | .74* | |
| Child disclosure | | | | | | |
| I tell my parents how I'm doing in school. | .12* | .68* | – .02 | | | .78* |
| I tell my parents about my activities with friends. | .02 | .82* | .05 | | | .87* |
| Parent Solicitation | | | | | | |
| My parents ask what I do in my free time. | – .08* | .86* | – .01 | | | .80* |
| My parents ask about things that happen at school. | – .06 | .82* | .05 | | | .82* |
| My parents talk to my friends. | .02 | .59* | – .03 | | | .64* |

Confirmatory Factor Analyses

We next evaluated the three-factor model within a CFA framework using the CS dataset, where PK included 3 items, PC included 4 items, and CDPS (a combination of child disclosure and parental solicitation) included 5 items as shown in Table 2. Results of the 3-factor CFA model indicated good fit (CFI = .97; RMSEA = .05; SRMR = .03), and as shown in Table 1, all factor loadings were significant. The intercorrelations between the factors were relatively high with PK and PC correlated at .75, PK and CDPS correlated at .61 and PC and CDPS correlated at .90. The latter correlation reflects, in part, the two items in PC that also loaded above .30 on CDPS.

Tests Of Invariance

Sex. Fit for the configural model was good, indicating configural invariance (CFI = 0.96, RMSEA = .061, SRMR = .037) across male and female students. Metric model invariance was rejected at $p = .029$ ($\chi^2(9) = 18.5$). However, the changes in fit indices ($\Delta CFI = 0.001$, $\Delta RMSEA = .001$, $\Delta SRMR = .003$) were minimal and fell within Chen's acceptable recommendations. The same was true for scalar invariance ($\chi^2(9) = 38.5$; $\Delta CFI = 0.002$, $\Delta RMSEA = .001$, $\Delta SRMR = .001$).

Grade. As with sex, configural invariance was established (CFI = 0.97, RMSEA = .060, SRMR = .036) and although Chi-square statistics indicated rejection of invariance, changes in fit statistics were minimal and fell well within Chen's acceptable recommendations (metric: $\Delta CFI = 0.002$, $\Delta RMSEA = .001$, $\Delta SRMR = .009$; scalar: $\Delta CFI = 0.003$, $\Delta RMSEA = .001$, $\Delta SRMR = .003$).

Ethnicity. Fit for the configural model was good across subgroups, indicating configural invariance for AI and White students (CFI = 0.96, RMSEA = .06, SRMR = .04). With configural invariance established, we proceeded to test for metric and scalar invariance. Metric invariance was marginally confirmed with $\chi^2(9) = 16.6$, $p = .054$, and with acceptable change of fit indices of $\Delta CFI = 0.000$, $\Delta RMSEA = .002$, $\Delta SRMR = .003$, while scalar invariance was confirmed with $\chi^2(9) = 7.1$, $p = .63$. We also tested invariance across the four grade and ethnicity

groups (AIMS, AIHS, WMS, WHS) simultaneously. Changes in fit statistics fell within Chen's recommendations (metric: $\Delta CFI = 0.002$, $\Delta RMSEA = .002$, $\Delta SRMR = .011$; scalar: $\Delta CFI = 0.004$, $\Delta RMSEA = .001$, $\Delta SRMR = .003$), thus confirming the scalar and metric invariance for grade and ethnicity.

Reliability

Cronbach alpha reliabilities were assessed for each factor using the full dataset, with results of .91 for PK (factor 1), .86 for PC (factor 2) and .89 for CDPS (factor 3).

Comparison Of Latent Means And Predictive Validity

Table 3 first presents significance tests across AI middle and high school students and White middle and high school students. Estimates for AI middle school students are fixed to 0, with comparisons to the other three groups. As the results show, White middle and high school students reported higher levels of parental monitoring except for PK for White high school students. These results are followed by correlations between the PMSS factors and the substance use measures. For AI students at both grade levels, each of the PMSS factors was significantly related to the substance use measures ($p < .001$). Among White middle school students, PK was significantly related to last month alcohol and drunkenness ($p < .05$), and all correlations were significant among White high school students.

Table 3. Latent Means of PMSS Measures and Correlations with Last Month Substance Use Measures

| | AIMS | | | AIHS | | | WMS | | | WHS | | |
|---|---------|---------|---------|---------|---------|---------|--------|---------|--------|---------|---------|---------|
| | PK | PC | CDPS | PK | PC | CDPS | PK | PC | CDPS | PK | PC | CDPS |
| Latent Means | 0.00 | 0.00 | 0.00 | -0.03 | -0.02 | -0.02 | 0.19** | 0.31*** | 0.26** | 0.10 | 0.18** | 0.20** |
| Correlations | | | | | | | | | | | | |
| Last Month Alcohol | -.20*** | -.17*** | -.15*** | -.19*** | -.19*** | -.12*** | -.14* | -.09 | -.06 | -.30*** | -.33*** | -.20*** |
| Last Month Drunkenness | -.10*** | -.08*** | -.07*** | -.12*** | -.13*** | -.08*** | -.06* | -.04 | -.04 | -.19*** | -.24*** | -.10** |
| Last Month Marijuana | -.39*** | -.36*** | -.34*** | -.32*** | -.40*** | -.29*** | -.12 | -.12 | -.11 | -.17** | -.28** | -.21** |
| <p><i>Note.</i> PMSS = Parental Monitoring Short Scale; PK = parental knowledge; PC = parental control; CDPS = child disclosure & parental solicitation; AIMS=American Indian Middle School; AIHS=American Indian High School; WMS=White Middle School; WHS=White High School;</p> <p>*$p < .05$, ** $p < .01$, *** $p < .001$.</p> | | | | | | | | | | | | |

Discussion

Parental monitoring is an effective preventive factor against child and adolescent problem behavior (Dishion & McMahon, 1998). An appealing feature of parental monitoring is its malleability. Parent training programs can improve parents' abilities to effectively monitor their child's activities and behaviors (Chu, Bullen, Farruggia, Dittman, & Sanders, 2015; Sanders, 2018). While now more than 20 years old, the newer formulation of this construct (Stattin & Kerr, 2000; Kerr & Stattin, 2000) provides new dimensions beyond parental knowledge (parental control, child disclosure, and parental solicitation) that broaden the scope and potential impact of this important measure. To

overcome the language and item length of the Stattin and Kerr (2000) items, we developed and evaluated the psychometric properties of a shortened version of the PK, PC, PS, and CD dimensions (PMSS).

Strong psychometric support was found for the factorial structure of the PMSS. In contrast to the findings of Stattin and Kerr (2000) and Kerr and Stattin (2000), we found support for a three-factor solution, supported in both EFA and CFA results. Whereas Stattin and Kerr identified two separate dimensions for PS and CD, our sample among both AI and White youth attending schools on or near reservations suggested that these two dimensions form a single factor. This would appear to suggest that youth are perceiving a dyadic communication dimension to parental monitoring. They did not appear to see their own disclosure and parental requests for information about their behavior to be separate dimensions. We recognize that our sample of AI and White youth on reservations is unique, and these findings may be limited to this population sample. Further research is needed to confirm the validity of the three-factor solution in other populations of youth. Nagoshi et al. (2011) indicate that they evaluated a measure of parental monitoring among Mexican American youth, adapted from Stattin and Kerr (2000), but their items were limited to PK. Similarly, Tebes et al. (2011) also limited their investigation of African American youth to PK. Replication of a three-factor findings is needed both among minority and majority youth.

Additionally, qualitative interviews of youths' perceptions of these items might help clarify the difference between our findings and Stattin and Kerr. Important qualitative inquiries might include whether youth believe that their disclosures to parents are voluntary or whether they perceive pressure to disclose their activities. Of interest also would be whether there are differences in perceptions and response to these items between youth engaged in problem behaviors such as substance use and those not engaged in these behaviors.

In addition to factorial validity and differences found in factor structure just described, these results indicate that the three-factor solution is invariant across AI and White youth on reservations, across middle and high school students, and across sex. Support was found across these comparisons for configural, scalar, and metric invariance.

Given the unique characteristics of AI families, including communication and parenting style, we did not expect to find non-invariance when testing across ethnicity for both middle and high school students. While AI parents may value autonomy both for themselves and for their children (Frankland, Turnbull, Wehmeyer, & Blackmountain (2004), AI and White parents on reservations may be more similar than different regarding parental monitoring. However, when comparing the latent means of the PMSS factors (Table 3), White youth reported higher levels of monitoring. This provides potential support for AI parenting providing more autonomy in regard to their children's behaviors. It is also important to note that as with most, if not all measures of parental monitoring, they assume a nuclear family. But as Walls et al. (2019) note, parenting structure differs in many Native communities, with extended family members assuming more of the disciplinarian role. Measurement of parental monitoring with measures that also assess student perceptions of extended family members may reveal important differences between indigenous and non-indigenous families.

Non-invariance was also found across developmental level. That is, middle school students responded to the items similarly to high school students. In some respects, this appears to be inconsistent with changes in the parent-child relationship from childhood through adolescence. Appropriate to the process of individuation and the ongoing adolescent developmental task of achieving increasing autonomy (Erikson, 1968), parents exercise increasingly less control over their children's activities (Collins, 1990; Marshall, Tilton-Weaver, & Bosdet, 2005). This process was confirmed in two prospective studies (Keijsers, Frijns, Branje, & Meeus; 2009; Keijsers & Poulin, 2013) among Dutch and Canadian adolescents in which PK, PC, CD, and PS declined across the period of early to late adolescence. Decline in PK, PC, CD, and PS was also confirmed in a meta-analytic study (Lionetti et al., 2018). Our test of latent means across middle to high school students indicated little change in levels of monitoring as perceived by AI youth. Among White youth, levels of monitoring did appear to lower from middle to high school. While older youth did not appear to perceive high levels of monitoring, one question that arises is whether parents of older youth who are more likely to engage in negative behaviors such as substance use may increase their levels of monitoring in response, thus matching the higher levels of monitoring for younger youth. However, Kerr, Stattin, and Pakalniskiene (2008) found that parents reduce monitoring behaviors in response to adolescent misconduct, while worrying more.

As noted earlier, Kerr and Stattin (2000) found that CD was a better predictor of substance use than other parental monitoring dimensions. Our results did not support this finding, but it is important to note again, that we found that CD and PS formed a single factor. Across all subgroups, PK was generally the most consistently related to lower levels of substance use. One exception was found among AI high school students which for last month marijuana use, PC was correlated more strongly to lower use than other factors.

Limitations And Conclusions

Several limitations must be considered in interpreting the findings of this study. First, no attempt was made to survey students who had dropped out of school. Early departure from school is associated with lower levels of parental monitoring (Reschly & Christenson, 2006)

and school dropouts are more likely to engage in substance abuse, particularly among minority youth (Swaim, Beauvais, Chavez, & Oetting, 1997). Further investigation of the PMSS with this subset of adolescent youth is needed. Second, survey data were cross-sectional, constraining our ability to determine causal relationships between components of the PMSS and substance use. Further investigation should utilize prospective designs to determine such relationships. Finally, these findings should be evaluated in samples of youth that differ ethnically and racially from the sample used in this study, as it is limited to reservation-area adolescents.

In conclusion, this initial test of the PMSS provides evidence for measurement invariance across middle and high school students, across sex, and across AI and White youth, suggesting that it may be useful across groups of ethnically diverse adolescents. Furthermore, the PMSS factors are negatively related to substance use as found in previous research. This shortened version with simplified language may provide a useful measure of a comprehensive measure of parental monitoring.

Declarations

Funding This study was funded by a grant from the National Institute on Drug Abuse (R01 DA00371) awarded to the authors.

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethics Approval The study was reviewed and approved by the Colorado State University Internal Review Board. In addition, approval was obtained from local school boards and Tribal Internal Review boards as required by local tribal law.

Informed Consent Informed consent was obtained from parents of students in addition to assent obtained from students.

References

- Abraham, K. G., Christopherson, V. A., & Kuehl, R. O. (1984). Navajo and Anglo childrearing behaviors: A cross-cultural comparison. *Journal of Comparative Family Studies*, *15*(3), 373–388, <https://doi.org/10.3138/jcfs.15.3.373>.
- Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, *103*(3), 411–423, <https://doi.org/10.1037/0033-2909.103.3.411>.
- Andreescu, V. (2019). Family, school, and peer influences on alcohol abstinence and use among American Indian and White female adolescents. *Deviant Behavior*, *40*(1), 56–73, <https://doi.org/10.1080/01639625.2017.1411032>.
- Boyd-Ball, A.J., Véronneau, M.H., Dishion, T.J., & Kavanaugh, K. (2014). Monitoring and peer influences as predictors of increases in alcohol use among American Indian youth. *Prevention Science*, *15*, 526–535, <https://doi.org/10.1007/s11121-013-0399-1>.
- Chen, F.F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*, 464–504, <https://doi.org/10.1080/10705510701301834>.
- Chu, J. T. W., Bullen, P., Farruggia, S. P., Dittman, C. K., & Sanders, M. R. (2015). Parent and adolescent effects of a universal group program for the parenting of adolescents. *Prevention Science*, *16*(4), 609–620, <https://doi.org/10.1007/s11121-014-0516-9>.
- Collins, W.A. (1990). Parent-child relationships in the transition to adolescence: Continuity and change in interaction, affect, and cognition. In R. Montemayor, G.R. Adams, & T.P. Gullotta (Eds.), *From childhood to adolescence: A transitional period?* (pp. 85–106). Thousand Oaks, CA; Sage.
- Dishion, T.J., & Loeber, R. (1985). Adolescent marijuana and alcohol use: The role of parents and peers revisited. *American Journal of Drug & Alcohol Abuse*, *11*(1-2), 11–25, <https://doi.org/10.3109/00952998509016846>.
- Dishion, T.J., & McMahon, R.J. (1998). Parental monitoring and the prevention of child and adolescent problem behavior: A conceptual and empirical formulation. *Clinical Child and Family Psychology Review*, *1*(1), 61–75, <https://doi.org/10.1023/A:1021800432380>.
- Elder, G. H., Jr., Eccles, J. S., Ardelt, M., & Lord, S. (1995). Inner-city parents under economic pressure: Perspective on the strategies of parenting. *Journal of Marriage and the Family*, *57*(3), 771–784, <https://doi.org/10.2307/353931>.

- Erikson, E. H. (1968). *Identity, youth, and crisis*. New York City: W.W. Norton & Company, Inc. Fletcher, A.C., Steinberg, L., & Williams-Wheeler, M. (2004). Parental influences on adolescent problem behavior: Revisiting Stattin and Kerr. *Child Development, 75*(3), 781-796, <https://doi.org/10.1111/j.1467-8624.2004.00706.x>.
- Frankland, H.C., Turnbull, A.P., Wehmeyer, M.L., & Blackmountain, L. (2004). An exploration of the self-determination as it relates to the Diné (Navajo) culture. *Education & Training in Developmental Disabilities, 39*(3), 191-205, <https://www.jstor.org/stable/23880162>.
- Garcia Coll, C. T., Meyer, E. C., & Brillon, L. (1995). Ethnic and minority parenting. In M. H. Bornstein (Ed.), *Handbook of parenting, Vol. 2: Biology and ecology of parenting*. (pp. 189–209). Lawrence Erlbaum Associates, Inc.
- Keijsers, L., Frijns, T., Branje, S. J. T., & Meeus, W. (2009). Developmental links of adolescent disclosure, parental solicitation, and control with delinquency: Moderation by parental support. *Developmental Psychology, 45*(5), 1314–1327, <https://doi.org/10.1037/a0016693>.
- Keijsers, L., & Poulin, F. (2013). Developmental changes in parent–child communication throughout adolescence. *Developmental Psychology, 49*(12), 2301–2308, <https://doi.org/10.1037/a0032217>.
- Kerr, M. & Stattin, H. (2000). What parents know, how they know it, and several forms of adolescence adjustment: Further support for a reinterpretation of monitoring. *Developmental Psychology, 36*, 366-380, <https://doi.org/10.1037/0012-1649.36.3.366>.
- Kerr, M., Stattin, H., & Burk, W.J. (2010). A reinterpretation of parental monitoring in longitudinal perspective. *Journal of Research on Adolescence, 20*(1), 39-64, <https://doi.org/10.1111/j.1532-7795.2009.00623.x>.
- Kerr, M., Stattin, H., & Pakalniskiene, V. (2008). Parents react to adolescent problem behaviors by worrying more and monitoring less. In M. Kerr, H. Stattin, & R. Engels (Eds.), *What can parents do? New insights into the role of parents in adolescent problem behavior* (Chap. 4, pp. 91-112). John Wiley & Sons, Ltd., West Sussex, England.
- Lac, A., & Crano, W.D. (2009). Monitoring matters: Meta-analytic review reveals the reliable linkage of parental monitoring with adolescent marijuana use. *Perspectives on Psychological Science, 4*(6), 578-586, <https://doi.org/10.1111/j.1745-6924.2009.01166.x>.
- Laird, R.D., Marrero, M.D. & Sentse, M. (2010). Revisiting parental monitoring: Evidence that parental solicitation can be effective when needed most. *Journal of Youth & Adolescence 39*, 1431–1441, <https://doi.org/10.1007/s10964-009-9453-5>.
- Lionetti, F., Palladino, B.E., Passini, C.M., Casonato, M., Hamzallari, O., Ranta, M., Dellagiulia, A. & Keijsers, L. (2019). The development of parental monitoring during adolescence: A meta-analysis. *European Journal of Developmental Psychology, 16*(5), 552-580, <https://doi.org/10.1080/17405629.2018.1476233>.
- Marshall, S.K., Tilton-Weaver, L.C., & Bosdet, L. (2005). Information management: Considering adolescents' regulation of parental knowledge. *Journal of Adolescence, 28*, 633-647, <https://doi.org/10.1016/j.adolescence.2005.08.008>.
- Mmari, K. N., Blum, R. W., & Teufel-Shone, N. (2010). What increases risk and protection for delinquent behaviors among American Indian youth?: Findings from three tribal communities. *Youth & Society, 41*(3), 382–413, <https://doi.org/10.1177/0044118X09333645>.
- Muthén, L. K., & Muthén, B. O. (1998-2011). Mplus User's Guide (Sixth Edition). Los Angeles, CA:
- Nagoshi, J. L., Marsiglia, F. F., Parsai, M., & Castro, F. G. (2011). The moderating effects of ethnic identification on the relationship between parental monitoring and substance use in Mexican heritage adolescents in the Southwest United States. *Journal of Community Psychology, 39*(5), 520–533, <https://doi.org/10.1002/jcop.20449>.
- Parke, R. D., & Buriel, R. (1998). Socialization in the family: Ethnic and ecological perspectives. In N. Eisenberg (Ed.), *Handbook of child psychology: Social, emotional, and personality development., Vol. 3, 5th ed.* (pp. 463–552). John Wiley & Sons, Inc.
- Racz, S.J., & McMahon, R.J. (2011). The relationship between parental knowledge and monitoring and child and adolescents conduct problems: A 10-year update. *Clinical Child & Family Psychology Review, 14*, 377-398, <https://doi.org/10.1007/s10567-011-0099-y>.
- Reschly, A., & Christenson, S. L. (2006). School Completion. In G. G. Bear & K. M. Minke (Eds.), *Children's needs III: Development, prevention, and intervention.* (pp. 103–113). National Association of School Psychologists.

- Robinson-Zañartu, C. (1996). Serving Native American children and families: Considering cultural variables. *Language, Speech, & Hearing Services in Schools, 27*, 373-384, <https://doi.org/10.1044/0161-1461.2704.373>.
- Sanders, M. R. (2018). The future of evidence-based parenting support programs. In M. R. Sanders & T. G. Mazzucchelli (Eds.), *The power of positive parenting: Transforming the lives of children, parents, and communities using the Triple P system*. (pp. 504–532). Oxford University Press.
- Satorra, A., & Bentler, P.M. (2001). A scaled difference Chi-square test statistic for moment structure analysis. *Psychometrika, 66*(4), 507-514, <https://doi.org/10.1007/BF02296192>.
- Stattin, H., & Kerr, M. (2000). Parental monitoring: A reinterpretation. *Child Development, 71*, 1072-1085, <https://doi.org/10.1111/1467-8624.00210>.
- Swaim, R. C., & Stanley, L. R. (2016). Multivariate family factors in lifetime and current marijuana use among American Indian and white adolescents residing on or near reservations. *Drug and Alcohol Dependence, 169*, 92–100, <https://doi.org/10.1016/j.drugalcdep.2016.09.028>.
- Swaim, R.C., Beauvais, F., Chavez, E.L., & Oetting, E.R. (1997). The effect of school dropout rates on estimates of adolescent substance use among three racial/ethnic groups. *American Journal of Public Health, 87*(1), 51-55, <https://doi.org/10.2105/AJPH.87.1.51>.
- Tebes, J.K., Cook, E.C., Vanderploeg, J.J., Feinn, R., Chinman, M.J., Shepard, J.K., Brabham, T., & Connell, C.M. (2011). Parental knowledge and substance use among African American adolescents: Influence of gender and grade level. *Journal of Child & Family Studies, 20*, 406-413, <https://doi.org/10.1007/s10826-010-9406-3>.
- Walls, M.L., Whitesell, N.R., Barlow, A.I., & Sarche, M. (2019). Research with American Indian and Alaska Native populations: Measurement matters. *Journal of Ethnicity in Substance Abuse, 18*, 129-149, <https://doi.org/10.1080/15332640.2017.1310640>.