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# Youth Disclosure: Examining Measurement Invariance Across Time and Reporter

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Youth Disclosure: Examining Measurement Invariance  
Across Time and Reporter

Robb E. Clawson

A dissertation submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

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## ABSTRACT

### Youth Disclosure: Examining Measurement Invariance Across Time and Reporter

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Doctor of Philosophy

Measurement invariance across time and reporter is rarely reported in the literature for measures of youth disclosure, even though it is often necessary to establish at least strong invariance before proceeding to further analyses such as comparing means across time or reporter. Measurement invariance was examined across time (ages 11, 14, and 17) and across reporter (youth report of disclosure to mother, youth report of disclosure to father, mother report of youth disclosure, father report of youth disclosure) with a sample of 348 youth and their parents. Youth report of disclosure to mothers demonstrated strong invariance across ages 11-14 and 14-17, but strong equivalence was not found for mother report over time across any age. Youth report of disclosure to mothers and fathers demonstrated strong equivalence at ages 11, 14, 17, and across ages 11-14-17. Mother and father reports also demonstrated strong equivalence at ages 11, 14, and 17. The item "I talk with my parent about how I am doing with school work" had lower factor loadings and higher intercepts at age 11 than at other ages for fathers and mothers and compared to youth report. Implications for youth disclosure theory and construct development are discussed.

Keywords: measurement invariance, youth disclosure, youth report, parent report

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## Youth Disclosure: Examining Measurement Invariance Across Time and Reporter

Adolescents actively manage the flow of information with parents through their choice to disclose to their parents (Smetana, Villalobos, Rogge, & Tasopoulos-Chan, 2010; Tilton-Weaver, 2014). In the case of most families, teens decide how much detail to share with parents regarding their thoughts/feelings and daily activities (e.g., where they go, who they are with, what they do when away from home; Stattin & Kerr, 2000; Tilton-Weaver, Marshall, & Darling, 2014). Youth disclosure has been increasingly scrutinized as a predictor of adolescent behavior problems, particularly following Stattin and Kerr's (Kerr & Stattin, 2000; Stattin & Kerr, 2000) reconceptualization of the parental monitoring construct. In these studies, Stattin and Kerr re-oriented parenting scholars to consider the relative merits of three key factors subsumed under the monitoring label – child disclosure, parental solicitation and parental knowledge.

The primary purpose of the Stattin and Kerr manuscripts (2000; 2000) was to assert (and provide evidence) that much of the existing research linking active parental monitoring efforts and youth behavior problems needed to be reevaluated because many of the assessments of parental *monitoring* were, more specifically, assessing parental *knowledge*. However, these studies also emphasized youth disclosure as a main source of parental knowledge, a finding that has subsequently been replicated using both cross-sectional and longitudinal methodologies (Kerr, Stattin, & Burk, 2010; Stattin & Kerr, 2000; Willoughby & Hamza, 2011).

Since Stattin and Kerr's reinterpretation, researchers have focused more attention on the previously mentioned monitoring-related factors, examining their relationship to behavior problems and other youth outcomes. In the case of youth disclosure, numerous studies have examined its association to adolescent problems and parental knowledge across child age and

reporter (Keijsers et al., 2009; Keijsers et al., 2010; Kerr, Stattin, & Burk, 2010; Laird & La Fleur, 2016; Laird, Marrero, & Sentse, 2010).

However, little attention has been given to the idea that youth disclosure may hold different meaning across child age and reporter and thus be measured differently across age or reporter. As examples, it may be that, at a fundamental level, youth disclosure (as reported by mothers) changes conceptually over time as mothers adjust their expectations involving the amount and type of information they expect an increasingly autonomous teen to share. Or perhaps, as youth develop, they consider certain types of information to have shifted from the family to the private domain (Smetana, Crean, & Campione-Barr, 2005). In addition, as personal issues shift to being more “off limits” to parents, youth may consider such issues outside of parental jurisdiction, making disclosure to parents less likely. Adolescents often claim to have “meta-jurisdiction” over determining when they are old enough to make their own decisions about personal and prudential issues, which is likely to affect the very meaning of disclosure to parents from an adolescent perspective (Daddis, 2008).

Expectations for what should be shared with parents are highly likely to change over time, perhaps differently for youth and their parents. Smetana, Metzger, Gettman, and Campione-Barr (2006) found that parents viewed their youth as significantly less obligated to disclose information to them as they got older, while youth viewed themselves as less obligated to disclose about moral and conventional behavior with age. Youth report the most rapid decreases in legitimacy beliefs around personal and peer-related issues during early adolescence (Darling, Cumsille, & Martinez, 2008), suggesting that there may be some age differences in the very meaning of youth disclosure items across youth age. However, despite the many informative findings by researchers around youth disclosure, an important measurement issue

remains unanswered: is it appropriate to use Stattin and Kerr's measure of youth disclosure across reporter (youth, mother, father) and across the developmental spectrum of adolescence?

A construct or measure that demonstrates statistical measurement equivalence over time or across groups is considered to be invariant. It is imperative to know whether a construct (or a specific measure of a given construct) is equivalent across groups (e.g., gender, reporter) or across time when examining theory and before examining subsequent research questions (Dyer, 2015). In fact, researchers should only assume that a construct does *not* differ across time or groups when evidence has first been found to establish equivalence (also known as measurement, construct or factorial invariance). Measurement invariance (or equivalence) testing involves placing a series of increasingly stringent model constraints across groups or time on factor loadings, then intercepts, then error variances. Comparisons of how well each model fits the data across the various constrained models provides evidence for whether a measure has the same properties, measurement structure, nature, meaning, and perceived meaning across various contexts. It is the responsibility of the researcher to demonstrate measurement equivalence before proceeding to further analyses. However, the opposite is more common in the youth disclosure literature, where equivalence is assumed without being tested (see as examples: Kerr, Stattin, & Burk, 2010; Laird & Marrero, 2010; Smetana, Villalobos, Tasopoulos-Chan, Gettman, & Campione-Barr, 2009; Stattin & Kerr, 2000).

The process of establishing construct equivalence across groups or time is not difficult, yet it is often omitted both in general social science research and, more specifically, in parental monitoring and youth disclosure research. This omission is concerning given that “factorial invariance is probably the most important empirical question to address in any analysis that involves more than one group and/or more than one time point. Factorial invariance is also one

of the most misunderstood concepts” (Little, 2013, p. 137). Thus, failure to validate the assumption of invariance prior to examining differences in youth disclosure across groups or time may render results incomparable across such groups. In addition, studying youth disclosure differences across contexts may yield a richer understanding of the essence and meaning of youth disclosure.

Researchers often assume but rarely report measurement invariance results for youth disclosure measures. This is true for Stattin and Kerr's measure of youth disclosure (a subset of their broader parental monitoring measure) – perhaps the most commonly used measure of youth disclosure since 2000. Due to the fact that neither the broader parental monitoring measure nor the youth disclosure subscale has an official name – it is most often simply referred to as "the youth disclosure items adapted from Stattin and Kerr's (2000) broader measure of parental monitoring" - it will be referred to here as the SKYD (Stattin and Kerr Youth Disclosure).

## **Literature Review**

### **Youth Disclosure**

Youth disclosure is defined as "the frequency with which youth initiate conversations with their parent regarding their daily activities," which may involve their friends, activities, and whereabouts (Criss et al., 2015, p. 671). This may sometimes be solicited by parents or it may be voluntary and spontaneous. One of the most common measures used by researchers to assess youth disclosure was developed by Kerr and Stattin (2000; Stattin & Kerr, 2000) and contains three items assessing disclosure and two items assessing secrecy. As noted previously, this measure of youth disclosure will be referred to here as the SKYD (Stattin and Kerr Youth Disclosure) and will be the focus of this study. However, in recent years researchers have identified secrecy as a separate, albeit related, construct from disclosure (e.g., Finkenauer,

Engels, & Meeus, 2002; Finkenauer, Frijns, Engels, & Kerkhof, 2005; Frijns, Keijsers, Branje, & Meeus, 2010; Smetana et al., 2006). Therefore, this study will specifically examine measurement invariance of the youth disclosure items of the SKYD, separate from secrecy items (leaving it for examination in a separate study). The specific disclosure items examined in this study are 1) "I talk with my parent about how I am doing with school work," 2) "I tell my parent about my day at school/work," and 3) "I tell my parent what I have done with friends when I get home." While researchers have frequently examined the relationship between overall levels of youth disclosure and various predictors and outcomes, researchers have rarely examined the specific items comprising youth disclosure measures or their measurement properties across time or reporter, and thus will be examined here.

Adolescents have been found to conceal information from parents for many reasons: to protect friends, to avoid revealing experimentation with drugs or alcohol, to avoid negative parental reactions that may lead to increased parental monitoring and control, to avoid revealing transgressions contrary to family rules, or to feel independent (Frijns, Keijsers, Branje, & Meeus, 2010; Marshall, Tilton-Weaver, & Bosdet, 2005; Smetana et al., 2006; Tilton-Weaver et al., 2010). Other reasons for not disclosing include minimizing parent-youth conflict, avoiding parental disapproval or punishment (Darling, Cumsille, Caldwell, & Dowdy, 2006; Marshall et al., 2005), gaining autonomy from parents (Finkenauer et al., 2002; Marshall et al., 2005), attempting to assert their power or manipulate parents (DePaulo & Kashy, 1998), asserting their personal choices (Darling et al., 2006), and to feel independent (Smetana et al., 2006). In response to disagreements with parents, adolescents most frequently employ the information management strategy of partial disclosure, wherein they share some information with parents but purposefully withhold other information (Darling et al., 2006). Adolescents also tend to view

disclosure over personal issues as discretionary (Smetana et al., 2006), and findings across youth ages indicate that youth desire more personal jurisdiction than parents want to allow (e.g., Cumsille, Darling, Flaherty, & Martinez, 2006).

Researchers have examined adolescents' willingness to disclose information to their parents in relation to several other factors. As examples, greater adolescent disclosure and less secrecy with parents has been found to be associated with better psychosocial adjustment and family relationships (Laird, Marrero, Melching, & Kuhn, 2013; Keijsers et al., 2010), greater parental trust in the adolescent (Kerr, Stattin, & Trost, 1999; Kerr & Stattin, 2000), and greater responsiveness and behavioral control (Soenens, Vansteenkiste, Luyckx, & Goossens, 2006).

Findings regarding group differences (based on youth age) are mixed. Some research suggests that older teens disclose less (Soenens et al., 2006) while other findings do not support a link between age and differences in disclosure levels (Smetana et al., 2006). Parents have been found to over-estimate both their knowledge and the amount their youth disclose to them (Cottrell et al., 2003; Smetana et al., 2006), while some researchers have characterized discrepancies between parent and youth report as an indication of high levels of problem behavior (Lippold et al., 2001; De Los Reyes, Goodman, Kliewer, & Reid-Quinones, 2010). Others have been more willing to recognize the normalcy of discrepancies between reporters in disclosure, particularly given consistent findings of parent-adolescent differences in the related domains of parental knowledge and parental monitoring. As examples, parental and youth assessments of parental knowledge of youth activities are correlated at around 0.25 (e.g., Pettit et al., 2001), with youth and parental characterizations of parental monitoring also having been found to be modest (0.30, Crouter et al., 1999).

### **Measurement Invariance**

Given the conceptual (and thus measurement) confusion that prompted the Kerr and Stattin articles (for additional details, see Omer, Satran, & Driter, 2016; Racz & McMahon, 2010), it is of particular importance to test the assumption of measurement invariance for youth disclosure using a clear and replicable method of analysis. Further justification for this study can be found in Vandenberg and Lance (2000), who emphasize the overall importance of invariance testing by stating that “it makes no sense to conduct tests of group differences when the constructs that are being measured differ across groups” (p. 37). Similarly, Widaman, Ferrer, and Conger (2010, p. 16) suggest that “invoking constraints associated with factorial invariance is a state-of-the-art approach that can and should be used to help ensure one is assessing change in the same construct over time.” In an effort to correct this oversight, this study was designed to test the assumption of measurement invariance for a specific measure of youth disclosure (the SKYD) across time (youth ages 11, 14, and 17) and across multiple reporters (child, mother, father). Given that measurement invariance is so rarely (and usually incompletely) tested and reported in the literature, the SKYD will be specifically examined in this study because it has been frequently used as a measure of youth disclosure.

Meredith (1993) and Widaman (Widaman et al., 2010) outlined a highly used approach for testing a series of four types of measurement invariance across group or time, from least restrictive (least constrained) to most restrictive (most constrained): configural, weak, strong, and strict factorial invariance. While these terms will be used here to refer to the level of measurement invariance being tested, it is important to note that researchers have also used different terms to refer to the specific constraints being placed (configural = structural, weak = metric, strong = scalar, strict = error variance invariance).



When examining measurement invariance through a structural equation modeling (SEM) framework, configural invariance is met when the same set of items (i.e., same theoretical model) and the same pattern of fixed and free loadings are used across group or time. To test for the next most rigorous level of invariance (weak invariance or metric invariance), factor loadings are constrained to be equal across group or time. When model fit does not worsen (compared to the configural model) the conclusion is that factor loadings are equal across time or group, that items capture the underlying construct equally well, and that any score differences are the result of actual response differences rather than measurement error. At the next level of scrutiny, strong equivalence is tested by constraining factor loadings and intercepts across groups or time. At a minimum, strong equivalence must be established in order for researchers to assume that latent variables are measuring the same underlying construct (Brown, 2006). A finding of strong equivalence indicates the absence of response bias, signifying that mean differences across time or group could be calculated and compared. If strong equivalence is not supported then any statistical analyses comparing means across time (or groups) would not be appropriate. Strict invariance is tested by constraining factor loadings, intercepts, and error variances across group/time. When strict invariance is found, any differences in variances of measured variables are considered differences in variances of the latent constructs, making group comparisons of latent constructs unbiased. Little (2013) considers testing for strict invariance to be unnecessary, given that this level of invariance is unlikely to be met and strong equivalence is sufficient.

### **Measurement Invariance for Youth Disclosure**

Cross-sectional and longitudinal designs often assume that sufficient evidence of measurement invariance has been found across time (and possibly across reporter), even though measurement invariance is rarely tested, reported on, and/or acknowledged in the process of

hypothesis testing. In fact, a comprehensive search of the literature yielded dozens of studies examining youth disclosure since Kerr and Stattin's (2000; Stattin & Kerr, 2000) re-examination of the field; however, a more detailed reading found that only two of these studies examined measurement invariance findings for their respective measure of youth disclosure. Both such studies used Stattin and Kerr's (2000) disclosure items but neither study found evidence of strong invariance (a necessary distinction to be able to compare means across time or reporter) and neither study referenced prior invariance testing (Frijns et al., 2010; Tilton-Weaver, 2014).

In the first such study, Tilton-Weaver (2014) found only weak invariance across time using youth reports of youth disclosure ( $n = 874$ ) using the three disclosure and two secrecy items from Stattin and Kerr (2000). Tilton-Weaver also tested (but did not report) measurement invariance across gender, with only configural invariance established, finding no evidence that youth disclosure (combined with secrecy items) measures the same underlying construct across gender longitudinally for youth reports (personal communication). This study was also limited because only two time points were used, only youth in early adolescence were included (7th-9th grades), mother and father reports were not examined across time or child gender, and disclosure items were combined with secrecy items despite research suggesting that disclosure and secrecy are similar but distinct domains of youth disclosure that should be measured separately (Frijns et al., 2010; Finkenauer et al., 2002).

In the second study, Frijns and colleagues (2010) also examined measurement invariance across time using reports from 309 youth collected annually for four consecutive years. They also used the three disclosure and two secrecy items from Stattin and Kerr (2000). However, they found evidence only for weak invariance across time, and rather than examining youth disclosure items separate from secrecy items they examined whether a two-factor structure (secrecy and

disclosure) was equivalent across time. They also only examined youth reports of their disclosure to parents and did not examine parent reports (i.e., mother or father perception of their youths' disclosure).

In the case of these two studies (the only ones that were found to examine and report a test of invariance assumptions for this or any measure of youth disclosure), insufficient evidence was found for researchers to assume equivalence of Stattin and Kerr's (2000) or any other youth disclosure measures across time or reporter (youth, mother, or father reports). Given the fact that the majority of studies neglected this crucial step, it is very likely that the field's understanding of youth disclosure (and its relationship to other key variables) is based on incomplete or faulty assumptions. This further highlights the need for additional studies examining measurement invariance of youth disclosure.

**Measurement invariance over time.** While many studies have examined youth disclosure over time, often comparing mean differences by age (or comparing older vs. younger youth), very few youth disclosure studies were found that addressed the possibility that the meaning of youth disclosure may change over time in the minds of youth, mothers, and fathers (e.g., Kuhn & Laird, 2011). Two studies (previously mentioned; Frijns et al., 2010; Tilton-Weaver, 2014) found evidence of either configural or weak invariance over time, but examined this in the case of youth respondents only and not mother or father reports. Furthermore, neither study found evidence of strong invariance, which is necessary to be able to compare means across group or time (Brown, 2006). While researchers often cite the finding that adolescents disclose less to parents as they age, findings are typically modest (Laird et al., 2010). Decreases in youth disclosure over time have either been found to be non-existent or very modest (Darling et al., 2006; Keijsers, Frijns, Branje, & Meeus, 2009; Soenens et al., 2006). This may tell us

more about the changing nature of youth and parent understanding of youth disclosure items across time than it does about absolute changes in the amount or frequency of youth disclosure across time. From a strict methodological perspective, until the assumption of measurement invariance across time has been examined (separately for youth, mother, and father report), and strong invariance across time has been found, researchers cannot be confident that the mean-level differences found are not, in fact, merely measurement differences across time.

Youth disclosure is more often examined during early and middle adolescence, with researchers often citing that developmental period of particular interest because that is when disclosure declines, concealment from parents increases, and concerns about personal autonomy peak for teens (Masche, 2010). In the current study we will examine youth disclosure across the beginning (age 11), middle (age 14), and end (age 17) of adolescence to examine invariance across the various developmental stages of adolescence.

**Measurement invariance across reporter.** As stated previously, little is known about measurement invariance across reporter because it is rarely tested or reported. It should also be noted that it is more common to use youth report than parent report and, when it is included, it is most often mother report only. Thus, very little of the youth disclosure research encompasses a father's perspective, which is common in the broader field of family research. Mothers are generally more engaged with their children in childrearing than are fathers (Crouter & Head, 2002), tend to have closer relationships with their children than fathers, and have more interaction with their children than fathers (Furman & Buhrmester, 1985; Larson et al., 1996). Fathers are more likely to rely on their spouses for information rather than receiving it directly from their children (Finkenauer et al., 2005; Smetana, Campione-Barr, & Metzger, 2006), which may lead fathers to feel like they are being more fully disclosed to than they are in the eyes of

their youth. Thus the reporter used is likely to distinctively impact research findings. It may be particularly true that youth expect themselves to disclose more information to mothers than to fathers about their "day at school/work" and "what I have done with my friends when I get home."

While some researchers have found disclosure being more strongly linked with behavior problems than are parental monitoring efforts, Laird and LaFleur (2016, p. 196) noted that "results often show different patterns depending on whether parents' or adolescents' reports of information management and monitoring are used as predictors as well as whether parents' or adolescents' reports of behavior problems are used as outcomes." Given the clear lack of consensus in the field, additional inquiry regarding reporter of youth disclosure is warranted. This study attempts to address this at a fundamental measurement level by specifically examining the assumption of measurement invariance across reporters (youth, mother, and father).

### **Summary**

Past studies have not sufficiently examined measurement invariance (factorial invariance) across child age and cross reporter (youth, mother, father) for youth disclosure. While several studies have minimally reported their own measurement testing results (Frijns et al., 2010; Tilton-Weaver, 2014), no studies have sufficiently addressed the issue of measurement equivalence testing across child age or reporter for any measure of youth disclosure, including the SKYD. The current study addresses this gap in the youth disclosure literature by addressing the following question: Should researchers assume measurement invariance (or equivalence) for Stattin and Kerr's (2000) measure of youth disclosure (SKYD) across child age (youth ages 11,

14, and 17) and reporter (youth, mother, father reports)? Measurement invariance will be specifically tested for:

(Across Time)

- Youth report of disclosure to mothers across ages 11-14-17.
- Youth report of disclosure to mothers across ages 11-14.
- Youth report of disclosure to mothers across ages 14-17.
- Youth report of disclosure to fathers across ages 11-14-17.
- Youth report of disclosure to fathers across ages 11-14.
- Youth report of disclosure to fathers across ages 14-17.
- Mother report of youth disclosure across ages 11-14-17.
- Mother report of youth disclosure across ages 11-14.
- Mother report of youth disclosure across ages 14-17.
- Father report of youth disclosure across ages 11-14-17.
- Father report of youth disclosure across ages 11-14.
- Father report of youth disclosure across ages 14-17.

(Across Reporter)

- Youth and mother reports of disclosure to mothers across ages 11-14-17.
- Youth and mother reports of disclosure to mothers at age 11.
- Youth and mother reports of disclosure to mothers at age 14.
- Youth and mother reports of disclosure to mothers at age 17.
- Youth and father reports of disclosure to fathers across ages 11-14-17.
- Youth and father reports of disclosure to fathers at age 11.
- Youth and father reports of disclosure to fathers at age 14.
- Youth and father reports of disclosure to fathers at age 17.
- Youth report of disclosure to mothers and fathers across ages 11-14-17.
- Youth report of disclosure to mothers and fathers at age 11.
- Youth report of disclosure to mothers and fathers at age 14.
- Youth report of disclosure to mothers and fathers at age 17.
- Mother and father reports of youth disclosure across ages 11-14-17.
- Mother and father reports of youth disclosure at age 11.
- Mother and father reports of youth disclosure at age 14.
- Mother and father reports of youth disclosure at age 17.

## **Method**

### **Sample**

Participants were taken from Waves 1 through 8 of the *Flourishing Families Project* (FFP), an ongoing longitudinal study of 500 families with adolescents taken from a community sample living around a large urban center in the Northwest from 2007-2014. Data for the FFP

were gathered using a cross-sequential design at wave one with the families being followed longitudinally at each subsequent wave. At Wave 1 the sample consisted of 500 families (147 single-parent and 348 two-parent) with a child between the ages of 10 and 14 ( $M = 11$ ,  $SD = 0.96$ ; 49.8% male at Wave 1), with a 96% retention rate at Wave 2, 91.8% at Wave 3, 93.8% at Wave 4, 92.6% at Wave 5 (see Day and Padilla-Walker, 2009, for a more detailed description of the sample and data gathering procedure). Seventy-six percent of mothers and 86% of fathers were European American, 13% of mothers and 6% of fathers were African American, 3% of mothers and 2% of fathers were Asian American, 2% of mothers and 1% of fathers were Hispanic, and 3% of mothers and fathers indicated that they were “mixed/biracial” or of another ethnicity. At each wave, families completed a 90-minute self-administered questionnaire and an interview. At Wave 1, 14% of families made less than \$25,000 per year, 16% made between \$25,000 and \$50,000 per year, and 70% made more than \$50,000 per year. The subsample used in this study consisted of 348 married or cohabiting heterosexual couples who did not separate during the time when the child was 11 to 17 (the time period used in the study; 48.4% male). Youth and parent reports were used at youth ages 11 ( $n = 207$ ), 14 ( $n = 324$ ), and 17 ( $n = 278$ ).

### **Sequential Cohort**

Data were organized and analyzed by youth age, rather than by the wave at which the data were collected, creating a cohort sequential design. This was done to better examine and understand youth disclosure specifically by age while also reducing heterogeneity of ages within each wave of data. Three specific youth ages (11, 14, and 17) were chosen for this study. These ages were chosen to represent pre-adolescence (age 11), middle adolescence (age 14), and late adolescence (age 17).

## Measures

**Youth Disclosure.** Youth disclosure to parents was assessed using a three-item measure (referred to here as the SKYD, Stattin Kerr Youth Disclosure) which was adapted from Kerr and Stattin's (2000) broader parental monitoring measure. The original measure included five items assessing youth disclosure, with three assessing disclosure and two assessing keeping secrets. Only the three disclosure items were included in the analyses in order to remain consistent with previous research findings that keeping secrets from parents is, mostly likely, a separate construct from the presence of active disclosure, with differing links to adolescent problem behaviors (e.g., Finkenauer, et al., 2002; Frijns et al., 2010). Responses were based on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). Questions were asked separately of parents and youth, with the wording changed to reflect the respondent. Youth responded with regards to their disclosure to their mother and father separately while parents responded with regards to their child's disclosure specifically to them. Questions included, "I talk with my parent about how I am doing with school work," "I tell my parent about my day at school/work," and "I tell my parent what I have done with friends when I get home."

Higher scores indicate more disclosure by the child, as perceived by the respondent. Cronbach's alpha coefficient was previously found to be .80 (for both parent and child report) for the child disclosure subscale among high school students, although this included the two secrecy items that are not included in the current study (Kerr & Stattin, 2000). Frijns and colleagues (2010) found that reliabilities ranged from .68 - .83 across waves (youth report) using only the disclosure items. Average reliability coefficients across waves in the current study were found to be .76 (mother report), .79 (father report), .76 (youth report of disclosure to mothers), and .77 (youth report of disclosure to fathers). Factor loadings for each item at each age and for each



reporter are found in Table 1. Low factor loadings suggest an item is not as highly correlated with the youth disclosure construct.

### **Missing Data**

Due to high retention rates across waves, there was relatively minimal missing data (for a longitudinal study) at ages 14 (6.8%) and 17 (20.2%). At first glance missing data at age 11 (40.2%) appears high, but was mostly due to the cohort-sequential design of the study, as only two waves were used to create this cohort while the age 14 cohort included up to three additional waves and the age 17 cohort included up to six additional waves. This was due to fewer youth entering the study sample at younger years and was not due to dropout or non-response. Given that missing data at age 11 was anticipated as part of the study design it is expected that the smaller age 11 cohort is data that is considered missing at random, thus full information maximum likelihood estimation is appropriate (Enders & Bandalos, 2001).

### **Analysis Plan**

For each reporter separately, factorial invariance was tested across child age (11, 14, 17). Next factorial invariance was tested across reporters (youth, mother, father), examining each child age separately. All analyses were performed using Mplus statistical software Version 7.3 (Muthen & Muthen, 1998-2014) using full information maximum likelihood (FIML) to account for missing data. See Figures 1-3 for SEM diagrams.

### **Testing Factorial Invariance**

Measurement invariance was tested across child age and reporter following Meredith's (1993) foundational recommendation for testing each of the four types of factorial invariance (see also Widaman et al., 2010). Each type of invariance (configural, weak, strong, and strict) includes an increasing level of measurement constraint, and changes in model fit are examined

(see below for additional details regarding model fit indices). Configural invariance is examined by having the same pattern of fixed and free factor loadings. In our analyses, configural invariance is assumed (but still reported) since the items used across time, reporter, and gender are the same. To test for weak equivalence (invariance) factor loadings were constrained to be equal across age groups, separately for mother reports about their youth, father reports about their youth, and youth reports (regarding disclosures to both mother and father separately). When model fit did not worsen (compared to the configural model), it indicated that loadings were equal across time or group, items captured the underlying construct equally well, and any score differences were the result of actual response differences rather than measurement error. In all models, errors on parallel items across reporter (or child age) were correlated to account for systematic item-based error.

Strong equivalence was tested by maintaining factor loading constraints across groups or time while also constraining intercepts to be equal across groups or time. Strict equivalence testing aims to determine the absence of response biases, which would signify that mean differences across time or group could be calculated and compared. If strong equivalence is not supported then any statistical analyses comparing means across time (or groups) would not be appropriate. A determination of strong invariance must be established in order for researchers to assume that latent variables are measuring the same underlying construct (Brown, 2006). Although strict invariance is not necessary to test for (Little, 2013), it is reported merely as a reference.

The comparative fit index (CFI) was used to evaluate the overall model fit of the model to the data and to determine if additional constraints significantly decreased model fit when factor loadings (weak equivalence), intercepts (strong equivalence), and residuals (error

variances; strict equivalence) were constrained to be equal across time (Widaman et al., 2010; Widaman & Reise, 1997). If one of the constrained models resulted in worsened model fit, the previous level was used as the final model. Significant worsening of model fit was indicated by more than a .01 decrease in CFI (Cheung and Rensvold, 2002; Little, 2013). Hu and Bentler (1999) recommend a CFI at or above 0.95 as an indicator of good model fit, with a CFI lower than 0.95 indicating adequate-to-poor model fit. Chi-square difference tests are commonly referenced when comparing changes in model fit. However, because chi-square fit statistics are sensitive to sample size they were reported in the results as supporting evidence but the CFI was used as the main determinant of significant change in model fit. While not used to determine significant worsening of model fit in measurement invariance testing, root-mean-square error of approximation (RMSEA) was also reported in the tables because it is a commonly known measure of model fit.

The following analyses were then performed. First, for each reporter separately (youth, mother, father), factorial invariance was tested across child age (11-14-17). If strong invariance was not found across ages 11-14-17 then additional invariance testing was done to determine if evidence of measurement invariance could be found across a smaller age range. This was done by examining separate models placing constraints across ages 11-14 and then across ages 14-17.

Next factorial invariance was tested across reporters, first comparing youth and mother reports, then youth and father reports, followed by comparing mother and father reports. This was done by running separate analyses for youth and mothers, again for youth and fathers, and again for youth and mothers. In each case, measurement invariance was first tested across all three child ages (11-14-17). Again, if strong invariance was not found then additional invariance

testing was done to determine if evidence of measurement invariance could be found across a smaller age range (across ages 11-14 and across ages 14-17).

### Results

Factor loadings and intercepts are reported in Tables 1 and 2. Details of invariance tests over time are found in Tables 3 and 4 and details of invariance tests across reporter are found in Tables 5 and 6. SEM diagrams are found in Figures 1-3.

#### Measurement Invariance Across Time (Child Age) – Youth Report

**Youth report of disclosure to mother, across ages 11-14-17.** The configural invariance model fit the data well (CFI = .989;  $\chi^2(15) = 29.48, p < .014$ ; RMSEA = .044) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(7) = 3.62, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .02 (exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 31.44, p < .001$ ). Thus strong equivalence constraints are not supported, weak invariance constraints are most appropriate, and measurement invariance across ages 11-14 and across ages 14-17 will now be examined.

**Youth report of disclosure to mother, across ages 11-14.** The configural invariance model fit the data adequately (CFI = .982;  $\chi^2(5) = 16.41, p = .006$ ; RMSEA = .069) with all standardized loadings greater than .40 and served as the baseline model. When factor loadings were constrained for the weak invariance model, the CFI was reduced by .001 (from .982 to .981, smaller than the Cheung and Rensvold (2002) .01 limit) and  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 2.32, p > .05$ ). When the weak invariance model was compared to the strong invariance

model by constraining intercepts, the CFI was reduced by .008 (from .981 to .973, smaller than the .01 recommendation) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 7.45, p < .05$ ), indicating evidence to support strong invariance constraints.

**Youth report of disclosure to mother, across ages 14-17.** The configural invariance model fit the data adequately (CFI = .993;  $\chi^2(5) = 11.52, p < .042$ ; RMSEA = .051) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak invariance model, the CFI remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 2.15, p > .05$ ). When the weak invariance model was compared to the strong invariance model by constraining intercepts, the CFI was reduced by .006 (from .993 to .987, smaller than the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 7.77, p < .05$ ), indicating evidence to support strong invariance constraints.

**Youth report of disclosure to father, across ages 11-14-17.** The configural invariance model fit the data well (CFI = .995;  $\chi^2(15) = 21.66, p < .117$ ; RMSEA = .031) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI actually increased by .002 from .995 to .997 and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(7) = 2.03, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .032 (from .997 to .965, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 49.05, p < .001$ ), indicating that weak invariance constraints are most appropriate, and measurement invariance across ages 11-14 and across ages 14-17 will now be examined.

**Youth report of disclosure to father, across ages 11-14.** The configural invariance model fit the data well (CFI = .997;  $\chi^2(5) = 6.83, p < .234$ ; RMSEA = .030) with all standardized

loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 1.89, p < .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .008 (from .997 to .989, smaller than the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 7.73, p < .05$ ), indicating that strong invariance constraints are most appropriate.

**Youth report of disclosure to father, across ages 14-17.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 3.03, p < .695$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 1.10, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .015 (from 1.000 to .985, greater than the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 20.58, p < .001$ ), indicating that weak invariance constraints are most appropriate.

#### **Measurement Invariance Across Time (Child Age) – Parental Report**

**Mother report of youth disclosure, across ages 11-14-17.** The configural invariance model fit the data well (CFI = .999;  $\chi^2(15) = 415.96, p < .385$ ; RMSEA = .012) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .034 (from .999 to .965, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 50.40, p < .001$ ), all indicating a worsening of model fit. Thus only evidence for configural invariance was found, and measurement invariance across ages 11-14 and across ages 14-17 will now be examined.

**Mother report of youth disclosure, across ages 11-14.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 4.53, p < .478$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .049 (from 1.000 to .951, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 35.78, p < .001$ ), indicating a worsening of model fit. Thus only evidence for configural invariance was found.

**Mother report of youth disclosure, across ages 14-17.** The configural invariance model fit the data well (CFI = .997;  $\chi^2(5) = 8.50, p < .131$ ; RMSEA = .039) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .006 (from .997 to .991, smaller than the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 8.77, p < .05$ ), indicating that weak invariance constraints are most appropriate.

**Father report of youth disclosure, across ages 11-14-17.** The configural invariance model fit the data well (CFI = .998;  $\chi^2(15) = 17.21, p < .307$ ; RMSEA = .021) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .032 (from .998 to .966, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 35.70, p < .001$ ), indicating a worsening of model fit. Thus only evidence for configural invariance was found, and measurement invariance across ages 11-14 and across ages 14-17 will now be examined.

**Father report of youth disclosure, across ages 11-14.** The configural invariance model fit the data well (CFI = .994;  $\chi^2(5) = 8.28, p < .141$ ; RMSEA = .045) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .027 (from .994 to .967,

exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 16.98, p < .001$ ), all indicating a worsening of model fit. Thus only evidence for configural invariance was found.

**Father report of youth disclosure, across ages 14-17.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 4.33, p < .504$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .003 (smaller than the .01 threshold) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 4.59, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .002 (from .997 to .995, within the .01 threshold) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 3.62, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI remained the same (.995) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(3) = 3.20, p > .05$ ), indicating that strict invariance constraints are appropriate.

### **Measurement Invariance Across Reporter – Youth and Parent Report**

**Youth and mother reports of disclosure to mother across age 11-14-17.** The configural invariance model fit the data well (CFI = .975;  $\chi^2(102) = 171.62, p < .000$ ; RMSEA = .037) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .033 (from .975 to .942, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 100.45, p < .001$ ), indicating a worsening of model fit. Thus only evidence for configural invariance was found, and measurement invariance across youth and mother reports at ages 11, 14, and 17 were then examined separately.



**Youth and mother reports of disclosure to mother at age 11.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 4.93, p < .425$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .083 (from 1.000 to .917, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 45.77, p < .01$ ), indicating a dramatic worsening of model fit. Thus only evidence for configural invariance was found.

**Youth and mother reports of disclosure to mother at age 14.** The configural invariance model fit the data well (CFI = .997;  $\chi^2(5) = 7.70, p < .174$ ; RMEA = .034) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI decreased by .01 (from .997 to .987, within the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 9.44, p < .05$ ). Because a decrease in the CFI of .01 is on the edge of Cheung and Rensvold's .01 threshold and the  $\Delta\chi^2$  was significant, only configural invariance was supported.

**Youth and mother reports of disclosure to mother at age 17.** The configural invariance model fit the data well (CFI = .996;  $\chi^2(5) = 9.25, p < .100$ ; RMSEA = .042) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 2.33, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .013 (exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 16.72, p < .001$ ). Thus weak invariance constraints are most appropriate.

**Youth and father reports of disclosure to father across ages 11-14-17.** The configural invariance model fit the data well (CFI = .994;  $\chi^2(102) = 117.59, p = .139$ ; RMSEA = .018) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .022 (from .994 to .972, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 59.70, p < .001$ ), indicating a worsening of model fit. Thus only evidence for configural invariance was found, and measurement invariance across youth and mother reports at ages 11, 14, and 17 were then examined separately.

**Youth and father reports of disclosure to father at age 11.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 4.01, p < .000$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .046 (from 1.000 to .954, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 26.53, p < .001$ ), indicating a worsening of model fit. Thus only evidence for configural invariance was found.

**Youth and father reports of disclosure to father at age 14.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 4.13, p < .531$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI (1.000) remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 2.80, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .002 (from 1.000 to .998, within the .01 threshold) and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = 3.46, p > .05$ ). Thus strong invariance constraints are appropriate.

**Youth and father reports of disclosure to father at age 17.** The configural invariance model fit the data well (CFI = .998;  $\chi^2(5) = 7.25, p < .203$ ; RMSEA = .033) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI remained the same (.998) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 1.51, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .02 (exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 22.50, p < .001$ ). Thus weak invariance constraints are appropriate.

### **Measurement Invariance Across Reporter – Youth Report of Disclosure to Mothers and Fathers**

**Youth report of disclosure to mothers and fathers across ages 11-14-17.** The configural invariance model fit the data well (CFI = .989;  $\chi^2(102) = 149.24, p = .002$ ; RMSEA = .030) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .002 (from .989 to .987, within the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 14.27, p > .001$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI decreased by .009 (from .987 to .978, within the .01 threshold) and the  $\Delta\chi^2$  was again significant ( $\Delta\chi^2(7) = 46.49, p > .001$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI decreased by .003 (from .978 to .975, within the .01 threshold) and the  $\Delta\chi^2$  was again significant ( $\Delta\chi^2(9) = 24.71, p > .01$ ). Thus strict invariance constraints are appropriate.

**Youth report of disclosure to mothers and fathers at age 11.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 8.34, p = .138$ ; RMSEA = .047) with all standardized

loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .005 (from 1.000 to .995, within the .01 threshold) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 4.01, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI remained the same (.995) and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = 2.35, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI again remained the same (.995) and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(3) = 2.93, p > .05$ ). Thus strict invariance constraints are appropriate.

**Youth report of disclosure to mothers and fathers at age 14.** The configural invariance model fit the data well (CFI = 0.999;  $\chi^2(5) = 5.81, p = .325$ ; RMSEA = .020) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI (1.000) improved and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 0.53, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI remained the same and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = 2.22, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI decreased by .005 (from 1.000 to .995) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(3) = 10.88, p < .05$ ). Thus strict invariance constraints are appropriate.

**Youth report of disclosure to mothers and fathers at age 17.** The configural invariance model fit the data well (CFI = 0.999;  $\chi^2(5) = 6.101, p > .05$ ; RMSEA = .020) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI (1.000) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 0.06, p > .05$ ). When the weak equivalence model was compared to the

strong equivalence model by constraining intercepts, the CFI was reduced by .001 (from 1.000 to .999) and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = 4.26, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI decreased by .008 (from .999 to .991) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(3) = 15.01, p < .001$ ). Thus strict invariance constraints are appropriate.

### **Measurement Invariance Across Reporter – Mother and Father Reports**

**Mother and father reports of youth disclosure across ages 11-14-17.** The configural invariance model fit the data well (CFI = .984;  $\chi^2(102) = 140.81, p = .007$ ; RMSEA = .028) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI was reduced by .002 (from .984 to .982) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(7) = 12.30, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .013 (from .982 to .969, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(7) = 40.75, p < .001$ ). Thus only weak invariance was found, and measurement invariance across mother and father reports at ages 11, 14, and 17 were then examined separately.

**Mother and father reports of youth disclosure at age 11.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 3.26, p = .66$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI (1.000) remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 1.61, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI decreased by .008 (from 1.000 to .992, within the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(2) = 7.20, p < .05$ ). When the

strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI decreased by .068 (from .992 to .924, exceeding the .01 threshold) and the  $\Delta\chi^2$  was significant ( $\Delta\chi^2(3) = 28.31, p < .001$ ). Thus strong invariance constraints are appropriate.

**Mother and father reports of youth disclosure at age 14.** The configural invariance model fit the data well (CFI = 1.000;  $\chi^2(5) = 3.87, p = .568$ ; RMSEA = .000) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI (1.000) remained the same and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 0.74, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI (1.000) remained the same and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = .17, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI (1.000) remained the same and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(3) = 1.60, p > .05$ ). Thus strict invariance constraints are appropriate.

**Mother and father reports of youth disclosure at age 17.** The configural invariance model fit the data well (CFI = 0.995;  $\chi^2(5) = 9.52, p = .091$ ; RMSEA = .047) with all standardized loadings being greater than .40 and served as the baseline model. When factor loadings were constrained for the weak equivalence model, the CFI decreased by .002 (from .995 to .993, within the .01 threshold) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(2) = 3.82, p > .05$ ). When the weak equivalence model was compared to the strong equivalence model by constraining intercepts, the CFI was reduced by .002 (from .993 to .991, within the .01 threshold) and the  $\Delta\chi^2$  was again nonsignificant ( $\Delta\chi^2(2) = 3.68, p > .05$ ). When the strong equivalence model was compared to the strict equivalence model by constraining error variances, the CFI decreased by

.001 (from .991 to .990, within the .01 threshold) and the  $\Delta\chi^2$  was nonsignificant ( $\Delta\chi^2(3) = 4.28, p > .05$ ). Thus strict invariance constraints are appropriate.

### Summary

**Measurement invariance across time (child age).** Youth report of disclosure to mothers demonstrated strong invariance across ages 11-14 and 14-17, but strong equivalence was not found for mother report over time across any age. This indicates that the measurement of the youth disclosure construct is different over time for mother report, but it is equivalent over time for youth report. Findings for youth and father report over time were mixed, with youth report of disclosure to fathers across ages 11-14 demonstrated strong invariance (age 14-17 did not) while father report of youth disclosure across ages 14-17 demonstrated strong invariance (age 11-14 did not). None of the four tests across ages 11-14-17 demonstrated strong invariance (youth report about mothers, youth report about fathers, mother report, father report), indicating a lack of measurement invariance across the full range of ages 11-17. Results indicate that means are not comparable across time for mother report of youth disclosure, youth report of disclosure to fathers across ages 14-17, and for father report of youth disclosure across ages 11-14.

**Measurement invariance across reporter.** Youth report of disclosure to mothers and fathers demonstrated strong invariance at ages 11, 14, and 17, as did mother and father reports at ages 11, 14, and 17. This indicates that youth see disclosure to mothers and fathers similarly during the beginning, middle, and end of adolescence and that mothers and fathers view their youths' disclosure similarly at each stage of adolescence. Youth and mother reports did not demonstrate strong invariance at any age (11, 14, or 17), while youth and father reports demonstrated strong invariance at age 14 but not at age 11 or 17. Results indicate that means are comparable across youth reports of mothers and fathers and across mother and father reports of

their youths' disclosure, but means are not comparable across mother and youth reports at ages 11, 14, or 17 or across youth and father report at ages 11 or 17.

### **Discussion**

The purpose of this study was to examine measurement invariance of Stattin and Kerr's (2000) measure of youth disclosure (referred to here as the SKYD) across time (child age) and across reporter (youth, mother, father). The results of this examination highlight the difficulty in achieving the strong invariance necessary to be able to compare construct means across the various stages of adolescence and across parent and youth report. Specifically, while mother and father perception of the meaning of youth disclosure items remained equivalent across all ages (11, 14, and 17), and youth perception of disclosure to mothers and fathers remained equivalent across all ages, youth and mother perception of youth disclosure items did not remain the same equivalent at any age and youth/fathers only had the same perception of youth disclosure items at age 14 (and but ages 11 or 17). In addition, mother report of youth disclosure was not found to be invariant over time, while father report was invariant across ages 14-17 but not across ages 11-14. These findings are particularly meaningful given that researchers so often use mother report of youth disclosure and do so across time at different youth ages (e.g., Keijsers & Laird, 2014; Kerr, Stattin, & Burke, 2010).

According to the current findings, this particular measure of youth disclosure (the SKYD) is not measured in the same way across youth and parent report (except for youth and fathers at age 14). Thus researchers should be cautious in using the SKYD across time for mothers and fathers and when comparing youth and parent reports. In light of the current findings it is also important for future researchers to better understand youth disclosure at the construct level as a



precursor to further use of the SKYD, and opens the door to question whether this may be true for other measures of youth disclosure as well.

### **Measurement Invariance Across Time**

Strong invariance was found for youth report of their disclosure to mothers over time, but was not found for mother report over time. This indicates that youth perceive youth disclosure items as being equivalent over time, whereas mothers do not. A closer look at factor loadings (standardized) and intercepts (unstandardized) for youth and mother report at each age provides context for these findings (see Tables 1 and 2). When evidence for weak (but not strong) invariance is found, a closer examination of the item intercepts may lead to further understanding, whereas when evidence for configural (but not weak) invariance is found, a closer examination of factor loadings for individual items may provide additional insight.

For youth report of disclosure to mothers, factor loadings for each item decreased from age 11-14 and then increased from age 14 to 17, but items mostly stayed in the same rank order and, not surprisingly, strong equivalence was established. However, for mother report, while the item "about my day at school/work" had by far the highest factor loading at each age (.910, age 11; .942, age 14; .921, age 17), the item "how I am doing with school work" had a factor loading of .518 at age 11 and then .706 at age 14 and .762 at age 17. The large discrepancy in the magnitude of the factor loadings from age 11 to 14 indicates that mothers may view youth disclosing about how they are doing with school differently at age 11 than they do at older ages (14 and 17), perhaps the main reason weak (or strong) equivalence was not found. A very similar pattern was found for fathers, with factor loadings for the item "how I am doing with school work" increasing from .544 at age 11, to .731 at age 14, and to .877 at age 17, with only configural invariance found across age 11-14. Another significant pattern emerged from age 11-

14 for both mother and father report, with intercepts being significantly higher at age 11 than at age 14 for mothers (4.72 at age 11, 4.06 at age 14) and for fathers (4.48 at age 11, 3.78 at age 14).

So why does the item "how I am doing with school work" have such a low factor loading and such a high intercept for mother and father reports at age 11 compared to age 14? And why is that not found for youth report of disclosure to mothers or fathers? While further testing is needed to better understand these findings, several hypotheses shall be provided. Youth at age 11 are typically in 5th or 6th grade, which is either the last year of elementary school or the first year of middle school, depending on the school district. (Sixth grade is the first year of middle school for the school district surrounding the area of the current sample.) Perhaps parents view the importance of their child disclosing to them about their school work at age 11 as being much less important than at age 14 or 17. It could be that parents view 11 year olds as not yet being in a highly evaluative school setting where grades count towards college admissions, leading to parents viewing disclosure about their school work as being less important than they view it in middle and late adolescence.

It is also possible, given the high intercepts at age 11, that parents assume there is less to disclose at age 11 so their child is disclosing close to "everything," parents are more directly involved in helping their child with school work at age 11, or parents may be over-inflating their own parenting skills by responding that their child is disclosing a lot about school work because that is something every parent "should" keep track of. And given the significantly higher factor loadings and intercepts for the item about school work for parents than for youth at age 11, it may be that parents value school work information much more than their youth do. This may be due to youth sharing only a few things while considering it a duty rather than a vulnerable act of

disclosure, whereas parents may feel that hearing about school work is very privileged information. It also may be that at age 11 youth do not feel they will be penalized for sharing about their school work, whereas there is risk they may be confronted or lectured if they share too much about either "my day at school" or "what I have done with friends" (Darling et al., 2006; Marshall et al., 2005). Parents may also view talking about school work as a chance to connect with their 11-year-old, whereas at older ages school work may become more of a point of contention. However, these plausible explanations are in need of being examined further in future research. This is especially true given there is significantly less research about youth disclosure at age 11 than there is about disclosure among older youth.

An important theory some researchers have used to organize the types of behaviors adolescents choose to disclose or keep secret is social domain theory (Turiel, 1983; Smetana et al., 2006, 2009; Nucci, 2001). According to social domain theory, individuals differentiate between several types of issues: prudential (regarding health, safety, comfort, or potentially harmful to self), moral (regarding the welfare of others, fairness, and rights), conventional (regarding arbitrary, contextually relative behavioral norms), personal (regarding control over one's body, appearance, privacy, activities, choices and peer choices), and multifaceted (issues overlapping the personal with either the conventional or prudential domains). Previous research suggests that across all adolescent ages, youth desire more autonomy over personal issues than parents are willing to grant (Smetana et al., 2005). Adolescents believe that parents have more legitimate authority in some domains more than others, which may be directly related to the domains for which adolescents' decisions to disclose to or keep secrets from parents. Unfortunately, the items in the SKYD do not include questions that give insight into the various domains that may affect youth disclosure at different ages. This potentially limits a richer

understanding of the nuances of youth disclosure, and perhaps insight into why factor loadings and intercepts are significantly higher at age 11 than at ages 14 or 17 for mother and father report of disclosure about school work. It may be important to include items that more specifically inquire about the types of activities and experiences youth may be having at these ages. For example, youth may be asked more specifically about how much they disclose "things that happen with friends that parents likely wouldn't approve of," "how you really feel about school and what happens there," "the thoughts and feelings you have about yourself," "what you think of how your parents parent you," and "how you really spend your time when using social media and other technology."

Not surprisingly, strong invariance was not found for any reporter over time when examining all three time points in one model (ages 11, 14, and 17), indicating that no reporter viewed youth disclosure as the same construct across all three youth ages. However, although no reporter demonstrated strong invariance across ages 11-14-17, a closer look reveals that the reasons for not finding strong equivalence differed by reporter. Youth report of disclosure to mothers and to fathers each demonstrated weak invariance, indicating that factor loadings are equivalent across ages 11-14-17, but the intercepts for the youth disclosure items are not equivalent. Thus future research can focus on whether there may be a certain bias when youth respond to the specific items of the SKYD. For both mother and father report only configural invariance was found, indicating that factor loadings are not equivalent across ages 11-14-17 for parent report. Thus a focus on which items are not viewed in the same way for parents across adolescence is warranted, as those items may demonstrate they are not appropriate questions across such a wide developmental range. Researchers would be wise to more closely examine how this measure of youth disclosure may not be viewed as the same construct from late

elementary school (age 11) to junior high (age 14) and to late adolescence and high school (age 17).

### **Measurement Invariance Across Reporter**

Youth viewed items assessing their disclosure to mothers and fathers as being equivalent, while mothers and fathers also viewed youth disclosure items as being equivalent. This has important implications, including that mothers and fathers are viewing their youths' disclosure in similar ways despite potential differences in perspective, role, gender differences, and differing relationships with their youth. This may result in youth feeling like they have shared with both parents because parents often share information with each other, an idea that has been suggested regarding how youth and parents view parental knowledge attained indirectly (Smetana, Campione-Barr, & Metzger, 2006).

Another significant finding across reporter is that youth and mothers did not consider this measure of youth disclosure to be the same construct at any age (11, 14, or 17) and strong equivalence was found for youth and father report at age 14, but only configural invariance was found at age 11 and only weak invariance at age 17. As mentioned previously, the item "how I am doing with school work" appears to be a main reason only configural invariance was established at age 11 for mother/youth report and for father/youth, with factor loadings differing greatly across reporter. At age 11 the standardized factor loading for mother report was .518 while it was .837 for youth report. For father and youth, the factor loading at age 11 was .544 for fathers and .834 for youth report. Factor loadings for the other items differed to a much smaller extent across reporter at age 11. At age 14, factor loadings were not equivalent for mother/youth report. Again, standardized factor loadings differed most significantly for the item "how I am doing with school work," with the factor loading for mother report (.942) being significantly

higher than for youth report (.725) and the other items having very similar factor loadings across reporter. This same pattern was not found for father/youth reports, as factor loadings were more similar (.885 for fathers, .819 for youth) and strong equivalence was found.

So what does it mean that the item about disclosing "about my day at school" have a significantly higher factor loading at age 14 for mother report than for youth report while the other items have similar factor loadings? Given that youth and mother report at age 14 nearly met the criteria for weak invariance, an examination of intercepts is also warranted. The intercepts for each item for mother report were higher than for youth report at every age, indicating that either mothers exhibit a bias that trends towards reports of higher levels of youth disclosure at ages 11, 14, and 17 or youth exhibit a bias that trends towards reports of lower levels at those ages. Further examination is needed to better understand and explain this. Social domain theory may provide additional insight, as certain domains may have more of an impact on differences in youth and mother perception of sharing "about my day at school/work" at ages 11 and 14 than at age 17. Interviews with parents and youth about the types of activities, experiences, and thoughts that crossed their minds as they considered how much is disclosed may be extremely informative. It may be that mothers assume less is happening generally for 11-year-old youth in, for example, the prudential domain (regarding health, safety, comfort, or potentially harmful to self), suggesting to mothers that their child is sharing "everything" that is happening for them at this younger age even if they share very little. In contrast, youth may feel like there is much that goes unshared with mothers about their day at school, perhaps much of which is not yet on the parental radar. Such information may not come as readily through questionnaire format and is perhaps best gathered through interviews with youth and parents.

This may lead to a better theoretical understanding of the domains that are considered differently for mothers and youth as they respond to disclosure items.

### **Limitations**

Study strengths include the large sample size, longitudinal research design, youth disclosure assessed from multiple reporters (youth, mother, father), and a low dropout rate across study waves. However, while measurement invariance testing can provide some valuable insight, one cannot necessarily "prove" that a specific measure is equivalent (invariant) across groups based on the testing results, as findings cannot be generalized to other youth disclosure measures or across other samples. Thus more measurement invariance testing is needed to substantiate (or provide contrary evidence to) the current findings. Given that the study sample had a higher than average SES and relatively low levels of youth externalizing behavior, measurement invariance findings may not be generalizable to families with below average SES or higher levels of youth externalizing behavior.

Families also filled out the questionnaire used in the study during the summer months between grades. It may be that results would differ if questions were answered during the academic school year rather than when youth were out of school. It may be that parents responded to questions based on their perception of their youth's disclosure overall, just at the current moment (with school most likely being out for the summer), or from the perspective of how things were when their child was attending school before summer break.

While the SKYD has been widely used in the study of youth disclosure, it does not include the more specific questions other youth disclosure scholars sometimes use, including those tapping into social domain theory. This may include, for example, questions about what teens talk about on the phone with friends (or to be more current, on social media and texting), if

or who they like or are dating, and if and how they are treating peers well or poorly. It is likely that other youth disclosure measures have very differing measurement properties and that different results may be found across time and reporter. Thus it may add a richer understanding of the process of youth disclosure for researchers to provide measurement invariance information for whatever youth disclosure measure is used.

### **Conclusion and Implications for Researchers**

Stattin and Kerr's (2000) reinterpretation of the field of parental monitoring and call to more accurately conceptualize the various domains under the parental monitoring umbrella led to an increase in the study of youth disclosure. Subsequently work by Frijns and colleagues (2010) identified, through factor analyses, that youth disclosure measures often used by researchers actually comprise two separate factors (disclosure and secrecy) that may have different relationships with such things as internalizing and externalizing problems. Despite the continued growth of the field of youth disclosure and an increase in research examining youth disclosure longitudinally and from the perspective of various reporters, researchers have consistently used measures of youth disclosure across time and across reporter without previously establishing appropriate levels of measurement invariance, running the risk of testing theoretical models that have not been sufficiently tested at the measurement level. This may lead to inaccurate or misleading results.

Given the inconsistent evidence of measurement invariance found within the current sample, this study provides evidence to suggest that Stattin and Kerr's widely used measure of youth disclosure (referred to here as the SKYD) is in need of more rigorous theoretical development and empirical testing prior to its use over time and across certain reporters. This is especially true when comparing means across time, including modeling growth over time (Dyer,



2015). The current findings suggest that the SKYD may not demonstrate enough measurement invariance (or equivalence) to be used to compare means across certain reporters (mother-youth, father-youth) or across time (particularly at age 11), and that doing so may lead to increased risk of misspecification if items are not given different weights through the use of latent variables.

While growth curve modeling using the SKYD is not appropriate, other longitudinal approaches such as autoregressive panel models may still be appropriate. It is up to the researcher to base their choice of analysis on the measurement properties of the constructs used, rather than selecting a method of analysis prior to understanding measurement properties. It is also the responsibility of researchers to either test for or report on previous measurement invariance findings for the SKYD or any other measure of youth disclosure used, and to provide a brief justification as to how their choice of analyses is appropriate given such construct-level measurement findings. When available measures do not demonstrate appropriate levels of measurement invariance for the analyses being performed it can be considered a call to researchers to spend more time at the theoretical level developing youth disclosure measures that are theoretically and statistically equivalent across time or across parent and youth reporters. While researchers may be hesitant to report measurement invariance results in their research out of fear that insufficient equivalence may render their results less meaningful, if all youth disclosure researchers tested for and reported on measurement invariance for measures used it would likely lead to greater emphasis on more theoretically and statistically accurate measures of youth disclosure, which would be to the benefit of all youth disclosure scholars.

Researchers would be wise to view a finding of a lack of measurement invariance to be an indicator that there is more to understand about youth disclosure than is currently understood. In addition, rather than examining increases and decreases in youth disclosure over time and

across reporter it is also important to examine the evolving nature of youth disclosure and its changing meaning in the eyes of youth and parents at different ages and developmental stages (Dyer, 2015). Otherwise researchers may be missing out on an increased understanding of the richness of youth disclosure across adolescence and from the perspectives of parents and youth.

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## Appendix A

Table 1. Standardized Factor Loadings – Youth Disclosure

I talk to/tell my parent about:	Factor Loadings (Standard Errors)					
	Youth About Mothers			Mother Report		
	Age 11	Age 14	Age 17	Age 11	Age 14	Age 17
1. How I am doing with school work.	.837 (.037)	.708 (.039)	.800 (.026)	.518 (.057)	.706 (.034)	.762 (.028)
2. About my day at school/work.	.754 (.039)	.725 (.039)	.869 (.025)	.910 (.067)	.942 (.033)	.921 (.024)
3. What I have done with friends.	.659 (.042)	.626 (.040)	.675 (.030)	.579 (.057)	.586 (.037)	.711 (.031)
I talk to/tell my parent about:	Youth About Fathers			Father Report		
	Age 11	Age 14	Age 17	Age 11	Age 14	Age 17
	1. How I am doing with school work.	.834 (.033)	.711 (.036)	.832 (.022)	.544 (.058)	.731 (.039)
2. About my day at school/work.	.829 (.033)	.819 (.034)	.952 (.019)	.987 (.060)	.885 (.037)	.816 (.032)
3. What I have done with friends.	.699 (.039)	.695 (.036)	.742 (.027)	.660 (.056)	.640 (.042)	.718 (.036)

Table 2. Unstandardized Intercepts – Youth Disclosure

I talk to/tell my parent about:	Intercepts (Standard Errors)					
	Youth About Mothers			Mother Report		
	Age 11	Age 14	Age 17	Age 11	Age 14	Age 17
1. How I am doing with school work.	4.21 (.057)	3.63 (.053)	3.65 (.050)	4.72 (.027)	4.06 (.041)	3.82 (.047)
2. About my day at school/work.	3.94 (.064)	3.61 (.055)	3.53 (.049)	4.25 (.045)	3.82 (.042)	3.72 (.048)
3. What I have done with friends.	4.08 (.057)	3.42 (.053)	3.42 (.047)	4.05 (.042)	3.86 (.038)	3.74 (.044)

I talk to/tell my parent about:	Intercepts (Standard Errors)					
	Youth About Fathers			Father Report		
	Age 11	Age 14	Age 17	Age 11	Age 14	Age 17
1. How I am doing with school work.	4.02 (.068)	3.43 (.063)	3.31 (.061)	4.48 (.044)	3.78 (.051)	3.67 (.057)
2. About my day at school/work.	3.64 (.075)	3.01 (.061)	3.14 (.056)	3.96 (.056)	3.47 (.054)	3.46 (.058)
3. What I have done with friends.	3.90 (.066)	3.19 (.059)	3.04 (.054)	3.86 (.055)	3.63 (.047)	3.57 (.052)

Table 3. Model Parameters for Measurement Invariance Tests of Youth Disclosure Over Time

	Youth Disclosure							
	Youth Report of Disclosure to Mothers				Mother Report of Youth Disclosure			
	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$
Age								
11-14								
$\Delta\chi^2$		2.32	7.45*	39.25***		35.78***	71.25***	42.06***
CFI	.982	.981	.973	.915	1.000	.951	.850	.793
RMSEA	.069	.059	.063	.096	.000	.100	.154	.157
14-17								
$\Delta\chi^2$		2.15	7.77*	65.75***		8.767*	15.36***	1.28
CFI	.993	.993	.987	.922	.997	.991	.979	.980
RMSEA	.051	.044	.053	.112	.039	.056	.075	.062
11-14-17								
$\Delta\chi^2$		3.62	31.44***	176.32***		50.40***	113.64***	60.85***
CFI	.989	.989	.968	.844	.999	.965	.885	.844
RMSEA	.044	.039	.060	.123	.012	.072	.119	.123

*Note:* Shading indicates the level of measurement invariance found. Each model is compared to the preceding model (i.e., weak is compared to configural, strong is compared to weak, and strict is compared to strong). Config. = configural; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

<sup>a</sup>  $\Delta df$  listed is for 11-14 and 14-17.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 4. Model Parameters for Measurement Invariance Tests of Youth Disclosure Over Time

	Youth Disclosure							
	Youth Report of Disclosure to Fathers				Father Report of Youth Disclosure			
	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$
Age								
11-14								
$\Delta\chi^2$		1.89	7.726*	21.56***		16.98***	52.44***	5.065
CFI	.997	.997	.989	.962	.994	.967	.875	.871
RMSEA	.030	.024	.045	.073	.045	.090	.153	.135
14-17								
$\Delta\chi^2$		1.10	20.58***	69.52***		4.59	3.62	3.20
CFI	1.000	1.000	.985	.923	1.000	.997	.995	.995
RMSEA	.000	.000	.063	.126	.000	.029	.035	.031
11-14-17								
$\Delta\chi^2$		2.03	49.05***	76.17***		35.70***	53.01***	4.165
CFI	.995	.997	.965	.915	.998	.966	.916	.918
RMSEA	.031	.023	.069	.096	.021	.073	.103	.091

*Note:* Shading indicates the level of measurement invariance found. Each model is compared to the preceding model (i.e., weak is compared to configural, strong is compared to weak, and strict is compared to strong). Config. = configural; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

<sup>a</sup>  $\Delta df$  listed is for 11-14 and 14-17.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 5. Model Parameters for Measurement Invariance Tests of Youth Disclosure Across Reporter

	Youth Disclosure							
	Youth and Mother Report				Youth and Father Report			
	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$
Age								
11								
$\Delta\chi^2$		40.85***	53.27***	37.48***		26.53***	38.22***	34.70***
CFI	1.000	.917	.806	.732	1.000	.954	.883	.821
RMSEA	.000	.136	.183	.186	.000	.114	.160	.171
14								
$\Delta\chi^2$		9.44*	5.92	152.05***		2.80	3.46	75.51***
CFI	.997	.987	.982	.795	1.000	1.000	.998	.888
RMSEA	.034	.055	.057	.169	.000	.000	.020	.125
17								
$\Delta\chi^2$		2.33	16.72***	30.28***		1.51	22.50***	18.20***
CFI	.996	.996	.983	.959	.998	.998	.978	.963
RMSEA	.042	.037	.067	.09	.033	.025	.077	.087
11-14-17								
$\Delta\chi^2$		100.45***	116.05***	281.97***		59.70***	80.40***	137.12***
CFI	.975	.942	.903	.806	.994	.972	.943	.891
RMSEA	.037	.055	.068	.093	.018	.037	.052	.069

*Note:* Shading indicates the level of measurement invariance found. Each model is compared to the preceding model (i.e., weak is compared to configural, strong is compared to weak, and strict is compared to strong). Config. = configural; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

<sup>a</sup>  $\Delta df$  listed is for ages 11, 14, and 17. The  $\Delta df$  is different for 11-14-17.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Table 6. Model Parameters for Measurement Invariance Tests of Youth Disclosure Across Reporter

	Youth Disclosure							
	Disclosure to Mothers and Fathers (Youth Report)				Disclosure to Mothers and Fathers (Mother and Father Report)			
	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$	Config.	Weak $\Delta df = 2^a$	Strong $\Delta df = 2^a$	Strict $\Delta df = 3^a$
Age								
11								
$\Delta\chi^2$		4.01	2.35	2.93		1.61	7.20*	28.31***
CFI	1.000	.995	.995	.995	1.000	1.000	.992	.924
RMSEA	.047	.051	.046	.04	.000	.000	.034	.089
14								
$\Delta\chi^2$		.53	2.22	10.88*		.74	.17	1.60
CFI	.999	1.000	1.000	.995	1.000	1.000	1.000	1.000
RMSEA	.020	.000	.000	.036	.000	.000	.000	.000
17								
$\Delta\chi^2$		.06	4.26	15.01***		3.82	3.68	4.28
CFI	.999	1.000	.999	.991	.995	.993	.991	.990
RMSEA	.020	.000	.018	.048	.047	.047	.046	.043
11-14-17								
$\Delta\chi^2$		14.27***	46.49***	24.71**		12.30	40.75***	28.93***
CFI	.989	.987	.978	.975	.984	.982	.969	.961
RMSEA	.030	.032	.040	.042	.028	.029	.037	.040

*Note:* Shading indicates the level of measurement invariance found. Each model is compared to the preceding model (i.e., weak is compared to configural, strong is compared to weak, and strict is compared to strong). Config. = configural; CFI = comparative fit index; RMSEA = root-mean-square error of approximation.

<sup>a</sup>  $\Delta df$  listed is for ages 11, 14, and 17. The  $\Delta df$  is different for 11-14-17.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

Appendix B

Figure 1. Testing Measurement Invariance Across Reporter (e.g., Youth and Mother)

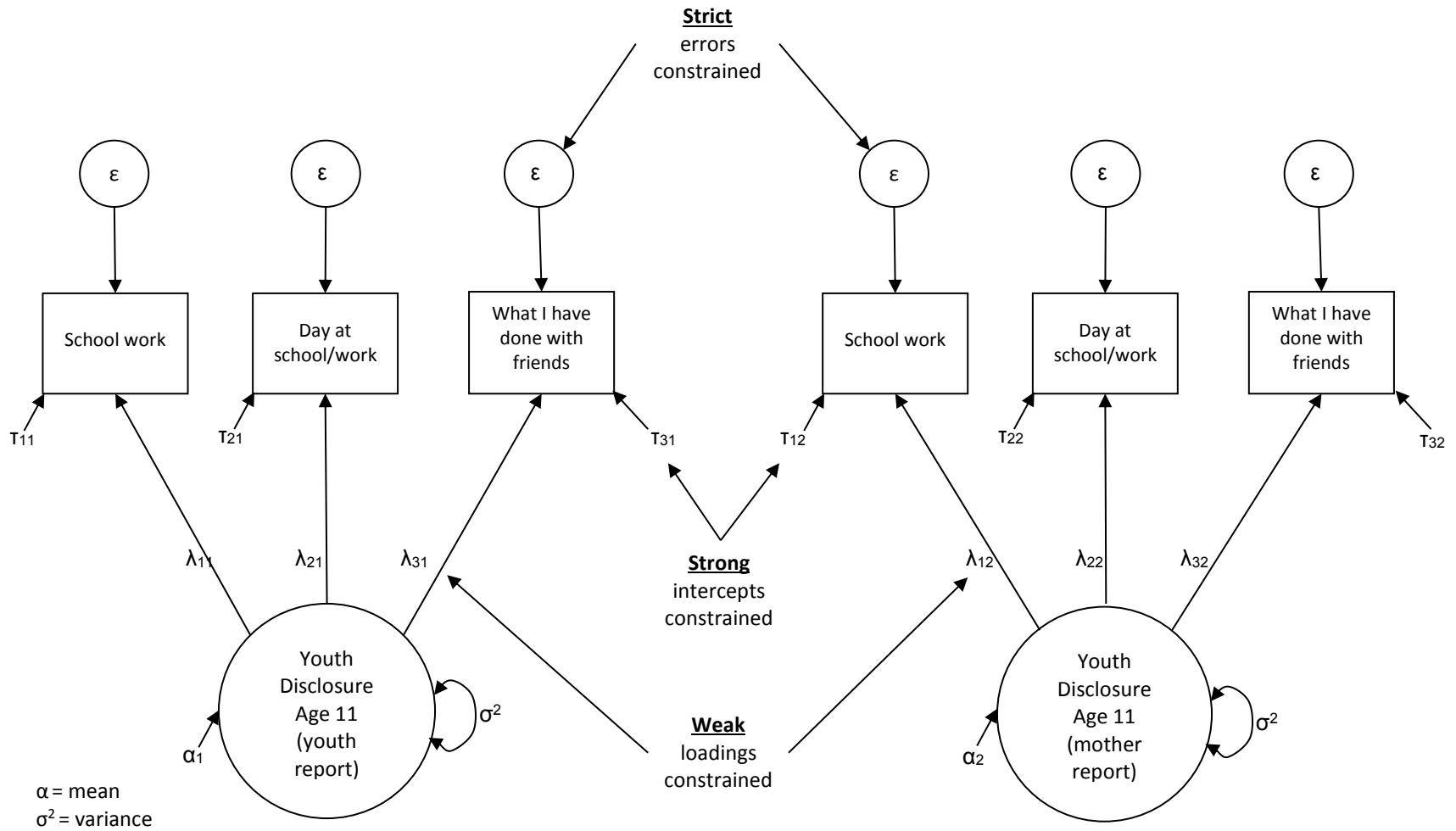




Figure 2. Testing Measurement Invariance Across Time (e.g., Age 11 and Age 14 – Youth Self-Report to Mother)

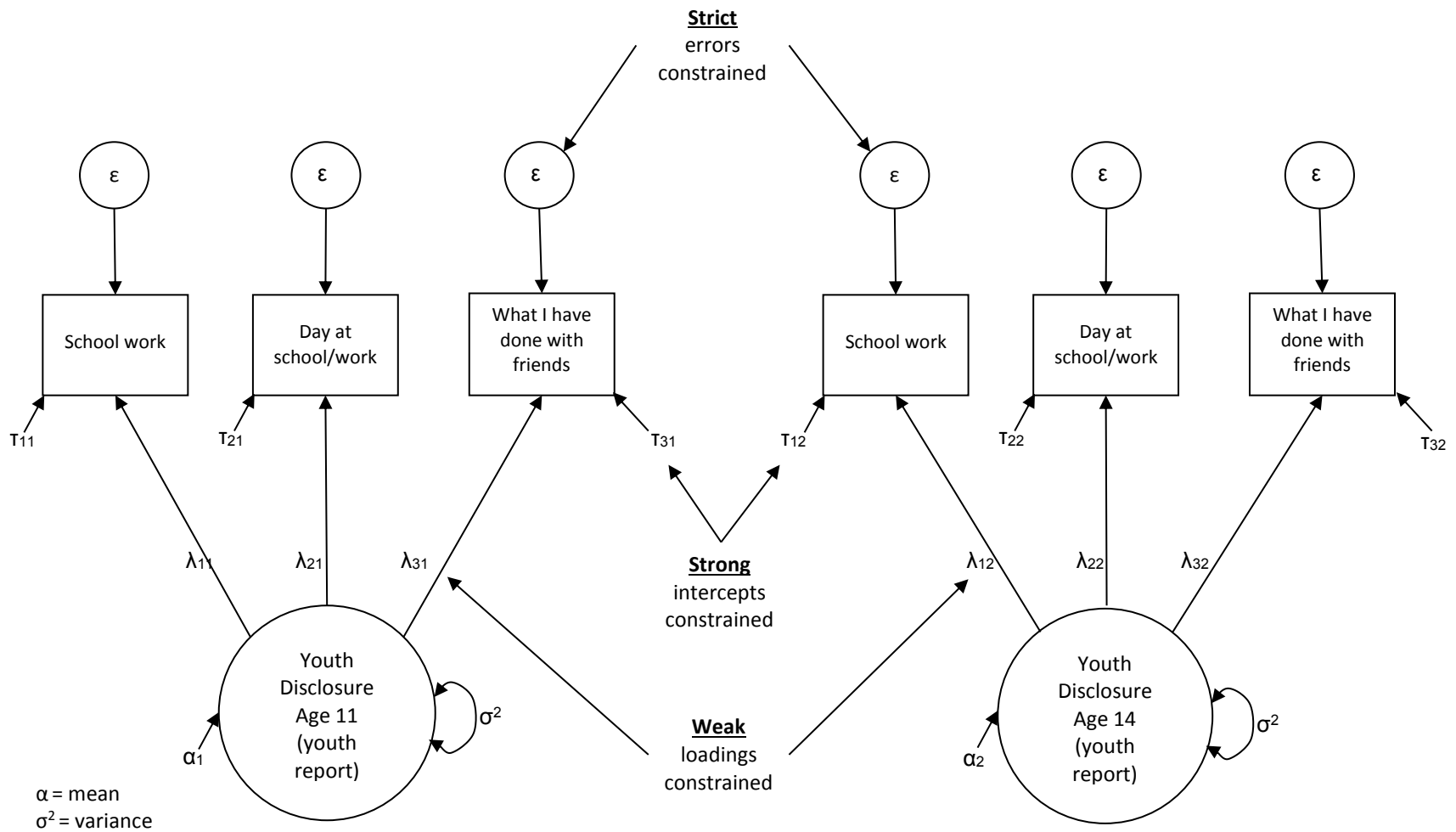


Figure 3. Testing Measurement Invariance Across Time (e.g., Youth Report)

