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# What Does Time Management Mean to You? Exploring Measures of Time Management and Group Differences.

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## ABSTRACT

For centuries people have been trying to find ways to effectively manage their time. Meanwhile, research in this area has lagged and provided inconsistent results about the outcomes (i.e., well-being and job performance) of the use of time management behaviors. A potential reason for the inconsistent results is the lack of a universal conceptualization of time management making it difficult to compare results. Further, it may be that certain groups use and/or interpret time management behaviors in different ways. This study investigated three of the most popular measures of time management concurrently. First, the measures were examined for statistical artifacts, specifically violations of measurement equivalence, using a combination of confirmatory factor analysis and item response theory data analysis approaches. Specific hypotheses concerning groups of interest for this study (gender, age, temporal awareness) were tested with measures that included equivalent items only. Finally, based on evidence that time management may be dispositional in nature (Shahani et al., 1993; Claessens et al., 2007), the time management measures were analyzed using an ideal point response model based on increasing evidence that personality measures are better served by this model (Stark, Chernyshenko, Drasgow, and Williams, 2006; Carter et al., 2014). Finally, directions for future research and implications for future measurement of time management are discussed based on findings.

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# INTRODUCTION

Time management seems to be of interest to many people. A quick google search of 'time management' generates over 500 million results (June 7, 2018). Upon closer review of these results, it appears that a person interested in time management may find themselves looking through countless blogs and videos by "ordinary people" or potentially signing up for a training course with a "professional" that may cost several hundred dollars or buying countless books on the subject. Likewise, organizations have been seeking to find ways for employees to manage their time and resources wisely for many years (Claessens, Roe, & Rutte, 2009). For instance, in the 1950's and 1960's training programs and advice to managers on how to best manage time to be more efficient and productive began in earnest (McCay, 1959; Drucker, 1967). Since that time, advice on managing time has been expanded to include all workers as they try to manage more obligations both at work and at home (Claessens et al., 2009).

Meanwhile, empirical research on time management is lagging behind (Claessens et al., 2009). In fact, there is so little empirical research, that it is not feasible to perform a meta-analysis (Aeon & Aguinis, 2017). Another reason it is difficult to draw conclusions from the current time management research is the different operationalizations of the construct and accompanying measures used (Claessens, VanEerde, & Rutte, 2007). For instance, some have operationalized time management as a technique for measuring time or using it effectively (Jex & Elacqua, 1999; Macan, 1994, 1996; Macan, Shahani, Dipboye, & Phillips, 1990; Mudrack, 1997; Britton & Tesser, 1991), while others focus on how time use is perceived and structured (Bond & Feather, 1988; Strongman & Burt, 2000; Sabelis, 2001; Vodanovich & Seib, 1997). This variation in operationalization is a

concern because the term, time management, is sometimes used interchangeably (Britton & Tesser, 1991) despite the possibility that they are measuring different things. In addition, multiple fields are studying time management with very little overlap or collaboration (Aeon & Aguinis, 2017).

The most cited measure of time management is Macan's Time Management Behavior Scale (TMBS; Macan, et al., 1990; Claessens et al., 2007; Aeon & Aguinis, 2017). This measure was derived from popular advice on time management (i.e., books, articles, trainings popular at the time) and likely reflects what most respondents consider time management to be (Macan et al., 1990; Claessens et al., 2007). Multiple reviews of the literature have expressed concern over the inconsistency in reliabilities of the measure (Claessens et al., 2007; Aeon & Aguinis, 2017). However, it does find support with outcomes related to well-being fairly consistently while outcomes related to performance are less consistent (Claessens et al., 2007; Aeon & Aguinis, 2017). Rather than proposing yet another definition and measure of time management, it would be prudent to further understand the measure most cited, the TMBS, in order to clarify some of the inconsistency and move research forward. Drasgow, Chernyshenko, and Stark (2010) contend that understanding how and why people respond to measures the way they do provides us with a better understanding of the nature of those responses. In addition, it is important to address whether measures of time management derived from different sources, as discussed above, are measuring the same concept. Two additional measures of time management frequently cited are the Time Management Questionnaire (TMQ; Britton & Tesser, 1991; Claessens et al., 2007) and the Time Structure Questionnaire (TSQ; Bond & Feather, 1988; Claessens et al., 2007). Therefore, using these three

measures to test hypotheses and research questions is prudent to understanding time management operationalization better.

**Time Management**

People face many demands from a variety of sources (i.e., work, school, family) and must find ways to effectively manage these demands within the hours available each day (Claessens et al., 2009). This concept of making the most of time is not a new idea. "Scholars and laypeople alike have reflected for centuries on how to best use time (e.g., Alberti, 1444/1971; Aurelius, 167/1949; Bennett, 1910; Franklin, 1757/1964; Penn, 1794; Seneca, 50/2014; St. Benedict, 530/1975), a fact that attests to the perennial pervasiveness of time management" (Aeon & Aguinis, 2017, p.311). Attempting to manage time with the use of aides still commonly used today started centuries ago. In the autobiography of Benjamin Franklin originally published in 1791, it is noted that he uses a small book to track his routines and plans for the day in an effort to gain order (Gannon & Buchanan, 2011). In 1796, John Letts started a stationary business with various time management products that were extremely successful and are still on the market today (Gannon & Buchanan, 2011). During the presidency of Dwight D. Eisenhower (1953-1961), his personal system of time-management came to light and is still popular today. His personal system included divisions of tasks into multiple categories based on their urgency and importance (Gannon & Buchanan, 2011). In 1959, McCay developed a time management training program which included identifying inefficient uses of time and how to make a plan for the day with task prioritization (Claessens et al., 2007). Drucker (1967) suggested simple solutions to handling time issues on the job, such as writing down work plans to increase performance (Claessens et al., 2007). Lakein (1973)

proposed many concepts that underly much of the current work on time management, such as prioritizing based on the importance of the task, clearly identifying goals, and organization of the workspace (Macan, 1994). In 1990, Stephen Covey came out with the book *The 7 Habits of Highly Effective People*, which eventually led to a line of planners and systems of time management. These systems are referred to as the Franklin Covey system as they draw upon the works of Benjamin Franklin (Gannon & Buchanan, 2011). As evidenced by this progression, the concepts surrounding time management have been utilized and built upon for centuries. Despite the long history of these concepts and probable utility for many people, the empirical research supporting the concepts lags behind. Truly understanding what makes these techniques useful and how they differ among diverse populations is still relatively unknown.

In the past 30 years, there has been a rise in empirical research trying to address time management (Claessens et al., 2007), yet we still have a very limited understanding of what it is and how people can be successful at it (Claessens et al., 2009). There is no agreed upon definition of time management, partly due to the fact that various disciplines research time management with slightly different viewpoints on what it entails (Aeon & Aguinis, 2017). For instance, in the field of sociology, time management may be viewed from the standpoint of how an individual's time interacts with other people in their social domain (Aeon & Aguinis, 2017). Meanwhile, in the field of psychology, time management is viewed from the standpoint of time constructs such as discounting and procrastination (Aeon & Aguinis, 2017). Finally, from a management standpoint, time management is viewed in relation to outcomes such as job performance, satisfaction, and work-life conflict (Aeon & Aguinis, 2017).

In a review of the literature, Claessens et al. (2007) defined time management as the "behaviors that aim at achieving an effective use of time while performing certain goal-directed activities" (p. 262). The behaviors they refer to are further divided into time assessment behaviors (self-awareness of time use), planning behaviors (i.e., setting goals, planning tasks), and monitoring behaviors (observation of one's use of time; Claessens et al., 2007). These behaviors work together in a cyclical fashion. In other words, "assessing time is an important prerequisite for making realistic plans, planning behavior provides a basis to guide future action, and monitoring is necessary for exercising control" (Claessens et al., 2009, p. 25). This definition takes on a self-regulation view (Claessens et al., 2009). "Self-regulation refers to the processes involved in attaining and maintaining (i.e., keeping regular) goals, where goals are internally represented (i.e., within the self) desired states" (Vancouver & Day, 2005). Claessens et al (2009) propose another dimension, executive behavior, to complete the self-regulatory view. Executive behavior aims to influence ongoing activity directly or indirectly. Meanwhile, a recent analysis of the time management literature proposed another definition as "a form of decision making used by individuals to structure, protect, and adapt their time to changing conditions" (Aeon & Aguinis, 2017, p.311). The authors intended this definition to be an agentic perspective of time (Aeon & Aguinis, 2017). Both definitions reflect the idea that time management is not the management of time per se, but rather the use of regulatory strategies to manage various activities within a set period of time.

Throughout the time management literature, there are two main outcomes predominantly studied: well-being and performance (Aeon & Aguinis, 2017). First, well-being is characterized by a generally positive state accompanied by greater levels of

satisfaction (Aeon & Aguinis, 2017; Häfner & Stock, 2010). The time structure questionnaire (TSQ) was first used to study the impact of time management on various facets of well-being (stronger sense of purpose, higher self-esteem, better health, and optimism; lower levels of depression, psychological distress, anxiety, and hopelessness; Bond & Feather, 1988). Time management is also associated with greater life satisfaction (Macan et al., 1990) and job satisfaction (Macan, 1994), lower anxiety (Lang, 1992), and lower strain (Jex & Elacqua, 1999). The research seems to indicate that time management leads to greater levels of well-being. However, research is not adequately large enough to conduct meta-analyses to provide more definitive results (Aeon & Aguinis, 2017).

Next, the relationship between time management and performance is more complex. There is a positive relationship when self-reported performance measures are used (i.e., Claessens et al. (2004) $r$=.33; Nonis, Teng, & Ford (2005) $r$=.25). Meanwhile, time management training failed to increase job performance when the performance was measured by supervisors (Macan, 1996). In addition, time management training failed to result in more efficient project completion and the overall performance assessments conducted by supervisors (Hafner & Stock, 2010). Similarly, there was no direct relationship found between time management and job performance measured by sales at a car dealership (Barling, Cheung, & Kelloway, 1996). Another objective example is those using quiet time (a time management technique to dedicate uninterrupted time to an important task) actually lowered job performance measured by errors on the tasks (Kaser, Fischbacher, & Konig 2013). As evidenced above, using time management techniques and training to increase time management behaviors does not necessarily increase

performance. This result is somewhat counterintuitive, and more research is needed to understand why these results are found.

The lack of consistency in results may be due to the studies in time management varying broadly in their definitions of time management and its operationalization, research methods used, and types of respondents (i.e., student, employees; Claessens et al., 2009). For instance, respondents in studies are students (i.e., Bond & Feather, 1988; Chang & Nguyen; Macan et al., 1990; Macan, 1994), employed adults (i.e., Adams & Jex, 1999; Claessens et al., 2004; Häfner & Stock, 2010; Macan, 1994) or trainees in a time management workshop (Van Eerde, 2003; Macan, 1996). Currently, the most common research method is self-report questionnaires. There are 10 types of questionnaires, but three are most frequently used (Claessens et al., 2007). First, the time management behavior scale (TMBS, Macan et al., 1990) is cited most frequently (Claessens et al., 2007). The TMBS is based on a list of popularized concepts of time management behaviors (Macan et al., 1990). There are four subscales identified by factor analysis including: setting goals & priorities, mechanics of time management, preference for organization, and perceived control of time (Macan et al., 1990). The reliability levels are moderate and vary greatly among studies (Claessens et al., 2007). Macan (1994) argued perceived control of time is an outcome variable of time management behaviors and should not be a part of the TMBS. Most studies have followed this recommendation (Claessens et al., 2007). Adam & Jex (1997) tested the underlying factor structure of the TMBS using confirmatory factor analysis (CFA) and found additional evidence for the 3-factor solution. Furthermore, Shahani et al. (1993) found convergent validity with other scales (including the TSQ) and concluded that the TMBS is the most elaborately

validated scale of time management behaviors. Internal consistencies are not reported in all studies using the TMBS, but those internal consistencies reported ranged from $\alpha$ = .50 to .90 (lowest coefficient alphas were for the preference for organization scale; Claessens et al., 2007). While the TMBS has the most support of all the time management measures, it is not ideal due to the variability in internal consistency values and inconsistencies with respect to the relations between subscales and outcome measures (Claessens et al., 2007). Further, in all the previously cited research on the validity and reliability of the TMBS, none have tested measurement equivalence across groups and subsequently answered any questions regarding differences among groups using time management (i.e., male versus female).

Similarly, Britton and Tesser (1991) developed the time management questionnaire (TMQ) which measures time management behaviors and feelings about time. Factor analysis identified three factors named short-range planning, long-range planning, and time attitudes (Britton & Tesser, 1991). Short-range planning is defined by items that require a short timeframe, such as a day or week (Britton & Tesser, 1991). On the other hand, long-range planning is defined by items that reflect goal setting for a longer range of time and behaviors that support those goals, such as maintenance of a schedule (Britton & Tesser, 1991). Similar to Macan et al. (1990)'s perceived control of time measure, the time attitudes factor includes items that indicate feelings about how time is being utilized (Britton & Tesser, 1991). Subsequent research has confirmed the factor structure of short-range planning and long-range planning (Barling, Kelloway, & Cheung, 1996; Trueman & Hartley, 1996; Claessens et al., 2007). In addition, the internal consistencies for short-range planning were reported as $\alpha$ = .85 while long-range planning

ranged from $\alpha$ = .71 to .73 (Barling et al., 1996; Trueman & Hartley, 1996; Claessens et al., 2007). The time attitudes factor appears to have received little attention in the literature thus far. In addition, the research to date does not address areas of group differences for the TMQ which will be beneficial for ongoing research.

Another commonly cited measurement device is the time structure questionnaire (TSQ, Bond & Feather, 1988). The items of the TSQ refer to the extent to which time is used in a structured and purposeful way. Factor analysis revealed six factors but only five could be named (sense of purpose, structured routine, present orientation, effective organization, and persistence; Bond & Feather, 1988; Claessens et al., 2007). The internal consistency for the total scale in three samples was $\alpha$ = .88, .92, and .91 while the subscales ranged from $\alpha$ = .55 to .75 (Claessens et al., 2007). The internal consistency from eight other studies found internal consistencies ranging from $\alpha$ = .66 to .75 (Claessens et al., 2007). While the internal consistency and factor structure of this measure have been explored, it has yet to be tested across groups in order to understand how it operates in different settings.

A universal conceptualization and operationalization of time management would serve the literature well by making it easier to compare and compile results (Claessens et al., 2009). It has been suggested that one or more of the existing scales could be improved to reach this goal (Claessens et al., 2009; Aeon & Aguinus, 2017). As mentioned previously, the TMBS is the most widely cited measure and may benefit from further scrutiny due to some inconsistencies in the reliabilities of the measure (Claessens et al., 2007; Aeon & Aguinis, 2017). Due to its popularity it seems the most likely candidate for a universal measure. Along those lines, the TMQ appears to be a valid

measure of time management similar in nature to the TMBS. As a result, consolidation of the TMBS and TMQ may be another option for universal measurement. Meanwhile, the TSQ is another robust measure of time management, although the goal of using this measure is to understand how much individuals feel their time is structured versus the use of behaviors designed to manage time effectively (Claessens et al., 2007). There is some question in the time management literature as to whether the various identified measures (i.e., TMBS, TMQ, TSQ) are measuring the same concept in a different way or if they are measuring different ideas entirely (Claessens et al., 2007). As such, the current research administered the three identified measures and analyzed the data in a parallel fashion to provide insight into the differences between the measures.

Furthermore, Claessens et al. (2009) suggest that research taking a differential perspective would be useful in expanding our knowledge of time management. Going beyond the typical personality traits that have been previously explored may offer insight into what types of people prefer certain time management behaviors (Claessens et al., 2009). Research into characteristics that are demographic is also important (Claessens et al., 2009). For instance, exploring gender differences is merited as some time management results show differences between males and females (Macan et al., 1990; Misra & McKean, 2000). Further research is worthwhile, especially if it reveals patterns that are associated with external measures of effectiveness (Claessens et al., 2009). Age is another category of interest as it may be that older and younger individuals differ in their time management behaviors (Claessens et al., 2009). This could be due to different experiences or different time perspectives and norms associated with different

generations (Claessens et al., 2009). In fact, some differences in age have been noted in previous research and merit further inquiry (Macan, 1994; Mudrack, 1997).

In a recent analysis of the time management literature, Aeon and Aguinis (2017) suggest several research perspectives for better understanding the dynamics of time management. One perspective is that individual differences in time preferences and perceptions may play a crucial role in time management outcomes. One of these proposed individual differences is that of temporal awareness which is an understanding of the amount of time available and that all activities come at a cost (Aeon & Aguinis, 2017). Essentially those with higher temporal awareness may put a higher value on their time because they understand it to be a resource. Interestingly, research has shown that not all people view time as a resource in the way they do money which leads to an inability to budget it properly (Aeon & Aguinis, 2017). Aeon and Aguinis (2017) suspect that there could be a nonresponse bias present in the time management literature because those who view their time as a resource may not view taking a survey about time management a good use of their resource. As a result, an interesting avenue of research is developing a better understanding of people who have higher temporal awareness. Specifically, the current research is interested in how those considered to be higher in temporal awareness may differ in their responses to time management measures than those lower in temporal awareness. For instance, is the use of a planner considered a poor use of a limited resource such as time? Could those who have higher temporal awareness differ in their responses to questions about the mechanics of time management while residing at the same level of the latent trait of time management as someone who is lower in temporal awareness? DuVernet, Wright, Meade, Coughlin, and Kantrowitz (2014) have analyzed

the extent to which personality items function differently on high versus low levels of general mental ability. The current research used a similar reasoning to establish whether time management behavior items function differently on high versus low levels of temporal awareness.

Before any substantive questions across groups are answered, it is necessary to assess the measure to ensure it does not contain statistical artifacts. The next section will elaborate on this concept before returning to the discussion of individual differences in time management.

## Measurement

### Measurement equivalence.

The TMBS (Macan et al., 1990), TMQ (Britton & Tesser, 1991), and TSQ (Bond & Feather, 1988) were constructed following the general guidance for scale development. It has been established that the scales are reliable and valid (Claessens et al., 2007). However, Vandenberg & Lance (2000) assert that "if not tested, violations of measurement equivalence assumptions are as threatening to substantive interpretations as is an inability to demonstrate reliability and validity" (p. 6). Measurement equivalence (or measurement invariance) exists when "individuals with equal standing on the trait measured by the test but sampled from different subpopulations have equal expected observed scores" (Drasgow, 1987, p. 19). Without measurement equivalence, it is difficult to identify meaningful differences between groups because the differences found in substantive testing may be a result of true mean differences as well as a difference between the latent variable and observed score that is not found across groups (Raju, Laffitte, & Byrne, 2002). "If one set of measures means one thing to one group and

something different to another group, a group mean comparison may be tantamount to comparing apples and spark plugs" (Vandenberg & Lance, 2000). Given the areas of interest for the current research is comparison of various groups, to be elaborated on shortly, it is a logical first step to demonstrate measurement equivalence is present with the time management instruments of interest.

Review of the literature on measurement equivalence reveals there are two methods used most often to establish measurement equivalence, item response theory and confirmatory factor analysis (Raju et al., 2002). Meade and Lautenschlager (2004) note that in an ideal situation, it is most desirable to use both methods to determine measurement equivalence. They suggest examining measurement equivalence with IRT methods first to identify item level information at the scale or subscale level. Those results can then be used to inform the confirmatory factor analysis (CFA) approach to establish measurement equivalence.

**Differential item functioning and differential test functioning.**

"Item response theory (IRT) is a rubric for a family of measurement models that describe the relationship between an individual's performance on a test item and his or her standing on a continuous latent trait" (Reise & Waller, 2002, p.88). Examples of a latent trait would be cognitive ability, personality, or attitudes. The latent trait is typically referred to as *theta* (θ). There are various IRT models available depending on the type of data (Duvernet et al., 2014). For the current study, Samejima's (1969) graded response model (GRM) was used to analyze the data. The GRM is an appropriate model for assessing polytomous data such as the Likert-type response scales in the current study (Raju et al., 2002). Foster, Min, & Zickar (2017) found that the GRM is the most widely

used IRT model in the organizational sciences and fits a tremendously wide range of constructs. The GRM estimates an item discrimination parameter and item category threshold parameters dependent on the number of response options (Duvernet et al., 2014). The category threshold parameters illustrate the likelihood that a respondent at a particular level of *theta* will choose a certain response (Duvernet et al., 2014). Once these parameters are established, probabilities may be computed for each of the item's response options as a function of *theta* (Duvernet et al., 2014). Using this information, an expected score for each item for each respondent may be estimated (Duvernet et al., 2014).

In addition to the individual estimations described above, it is possible to estimate item parameters separately for multiple groups (Duvernet et al., 2014). For example, item parameters may be established for males and females separately. From these estimations it is possible to see if the items function in a different way across these groups (Duvernet et al., 2014). When the relationship between the score of an item and the underlying trait are not the same across groups, it is commonly referred to as differential item functioning (DIF; Tay et al., 2015). IRT techniques established for analyzing DIF provide a way to assess measurement equivalence of items and subscales across groups (Raju et al, 2002). A key difference with the IRT approach and the CFA approach, discussed later, is that it assumes a nonlinear relationship with the underlying trait and the observed score at the individual item level while the CFA approach assumes a linear relationship at the item level (Raju et al., 2002). Although DIF may be established for one or more items, it does not necessarily mean that the entire test is violating measurement equivalence. There may be items displaying DIF that favor one group while other items favor another group. In this case, the DIF would essentially cancel out and the test would not be displaying

differential test functioning (DTF; Chalmers et al., 2016). Meanwhile, substantial DTF could be present due to the aggregation of trivial and insignificant item differences (Chalmers et al., 2016). As a result, the current study examines DIF and DTF to aide in the determination of measurement equivalence across groups.

As discussed above, some differences between male and female participants have been identified in the literature. Specifically, in studies utilizing the TMBS to measure time management, gender differences were noted in the subfactors of *mechanics* (Macan et al., 1990; Macan, 1994; Misra & McKean, 2000), *setting goals* (Misra & McKean, 2000) and *perceived control of time* (Macan, 1994, Misra & McKean, 2000). Bond and Feather (1988) noted a significant difference in gender on the subfactor *structured routine*. Meanwhile, another study noted there were only trivial differences between genders on the TMBS and TSQ (Mudrack, 1997). Trueman and Hartley (1996) noted gender differences on the TMQ subfactor *short-range planning* while other studies did not report demographic information (Britton & Tesser, 1991; Barling et al., 1996). Overall, the lack of consistent findings indicates that there is a need for the time management measures to be analyzed for measurement equivalence before proceeding with any substantive testing.

*Research Question 1a*: Will DIF and DTF analyses reveal the time management measures are equivalent across gender?

Also noted previously, there have been some differences identified in regard to age. Mudrack (1997) noted higher scores for older participants on the TSQ subfactors *present orientation* and *effective organization* as well as the TMBS subfactor *perceived control of time*. Meanwhile, Macan (1994) reported significant differences on the TMBS

subfactors *goal setting* and *preference for organization* only. In addition, Macan et al. (1990) reported age related differences on the TMBS subfactors *mechanics* and *preference for organization* only. Bond and Feather (1988) note inconsistent correlations between age and the various subfactors within the samples used in their study. Trueman and Hartley (1996) reported significant differences between younger and mature students on the TMQ subfactor *long-range planning* with no significant differences noted for *short-range planning*. Again, there is a lack of consistency in findings as to what specific subfactors may display actual differences in age on the time management measures. As a result, it is prudent to examine the time management measures for measurement equivalence.

*Research Question 1b:* Will DIF and DTF analyses reveal the time management measures are equivalent across age?

As noted previously, a new line of research has been proposed to understand how individuals with differing levels of temporal awareness respond to time management measures. Duvernet et al. (2014) investigated whether differences in general mental ability (GMA) would lead to differential functioning (DF) in personality items. Differential functioning, described in more detail below, is a complimentary form of measurement equivalence testing to the CFA approach (Raju et al., 2002). Duvernet et al. (2014)'s research illustrates that a participant's response level to one construct (i.e., general mental ability) can have an effect on the measurement of a different construct (i.e., personality). The authors emphasize that this methodology should be used in more settings as there are many differences that may cause DF beyond demographic differences (Duvernet et al., 2014). As such, the current research seeks to further the time

management literature by exploring whether differences in temporal awareness influence how participants respond to the time management measures.

*Research Question 1c:* Will DIF and DTF analyses reveal the time management measures are equivalent across high and low temporal awareness?

**Confirmatory factor analysis.**

A CFA model may be used to test measurement equivalence by conducting a series of tests. It should be noted that these tests are considered sequential and each subsequent step should only be conducted if the previous test demonstrated equivalence (Vandenberg & Lance, 2000). Partial equivalence may be established by detecting and releasing the constraint that is the source of the poorly fitting model (Vandenberg & Lance, 2000). Once the model with partial equivalence has been established as a better model, subsequent testing may resume with the new model (Vandenberg & Lance, 2000). As noted previously, IRT methods are used in conjunction with the partial equivalence testing to determine appropriate items to remove prior to subsequent testing.

The first step in measurement equivalence testing is to perform a test for configural invariance which establishes a baseline to compare to more restrictive subsequent models (Schmitt & Kuljanin, 2008). This test establishes whether the factor structure is the same across groups of respondents (Schmitt & Kuljanin, 2008). If there are no significant differences as a result of this test, it implies that the groups were using the same theoretical frame of reference when responding to the measure and might be able to be compared on tests of mean group differences for hypothesis testing (Vandenberg & Lance, 2000). The next steps of equivalence testing should be continued before deeming the measure equivalent, however. A test of metric equivalence is the next

step and it tests that the values of the factor loadings of the variables on the factors are equivalent across groups (Schmitt & Kuljanin, 2008). This test is stronger for factorial invariance than the previous test of configural invariance (Vandenberg & Lance, 2000). The next step is a test for scalar invariance which requires that intercepts of like items' regressions on the latent variable are equivalent across groups (Vandenberg & Lance, 2000). This test is considered a test for systematic response bias across groups by some (Vandenberg & Lance, 2000). The next step is to test the equality of the residual variances associated with each observed variable (Schmitt & Kuljanin, 2008). As a final step, tests of the null hypothesis that factor variances and covariances are equivalent across groups is conducted (Vandenberg & Lance, 2000). Vandenberg and Lance (2000) indicate that the first four tests are testing aspects of measurement equivalence while the last test is testing aspects of structural equivalence. This final test may indicate that one group is using a smaller range of the construct continuum than the other and the conceptual domain used to respond may differ by group.

Following the same logic described above for the IRT method of measurement equivalence testing, the following research questions are proposed.

*Research Question 2a*: Will confirmatory factor analysis reveal the time management measures are equivalent across gender?

*Research Question 2b:* Will confirmatory factor analysis reveal the time management measures are equivalent across age?

*Research Question 2c:* Will confirmatory factor analysis reveal the time management measures are equivalent across high and low temporal awareness?

## Time Management and Individual Differences

As noted previously, there are several individual differences in time management behaviors of interest to the current study. These differences are explored in more detail here.

### Gender.

Currently, women represent a large portion of the workforce and are increasingly represented in higher status roles, such as CEO's (Watson, Goh, & Sawang, 2011). These changes are representative of the decreased importance of physical sex differences due to less need for women to feed children exclusively, lower levels of births, and a decrease in the reliance on strength and size to perform work duties (Eagly & Wood, 2012). In addition to those stressors commonly experienced by men, women also report experiencing unique stressors: gender-role stereotypes, sex discrimination and harassment, social isolation, and work-family conflict (Watson et al., 2011). For instance, women report that they take on the majority of childcare and household work regardless of whether both spouses are working full-time (Eagly & Wood, 2012). This may be due to continued beliefs that men lack the communal skills to take on such roles (Eagly & Wood, 2012).

"Role entrapment refers to mainstream society's feelings of prejudice and negative stereotypes toward members of certain groups" (Jackson, Mackenzie, & Hobfoll, 2000, p. 285). The feelings of inequality generated by role entrapment may act as a barrier to appropriate self-regulation (Jackson et al., 2000). Specifically, self-efficacy may be compromised. In addition, external resources may be diminished in cases such as sex discrimination which may lead to the inability to appropriately self-regulate (Jackson

et al., 2000). Self-efficacy is the belief people have about their ability to exercise control of their level of performance or events in their lives (Bandura, 1991). It is thought to be the most important proximal factor of human self-regulation (Bandura, 1991). Given time management is defined in terms of self-regulation, it is logical to conclude that time management may be hindered by some of these same ideas. For instance, based on gender-stereotypes, women may be expected to take on extra roles in the organization, such as party planning or cleaning. In such an instance, women would have more items on their to-do list and less ability to manage all the responsibilities in the time available.

Similarly, work-family conflict may be a stressor because traditional gender roles specify that women are responsible for duties around the house such as cooking, cleaning, and child-rearing while men are traditionally not viewed as a major part of these areas. In this circumstance, the woman would again have more items on the to-do list than a man and less ability to manage them in the time available. Macan (1994) has suggested that to-do lists and schedules may serve as a method of feedback for individuals that makes them feel they have less perceived control of time (time management self-efficacy) when they are not able to meet all the demands outlined on these lists. Individuals are thought to internalize gender roles which become the self-standards they regulate their behavior against (Eagly & Wood, 2012). Other people's expectations provide a social regulatory process as well (Eagly & Wood, 2012). It is possible that women engage in time management behaviors, such as maintaining a to-do list, to attempt to manage their various roles and responsibilities. Meanwhile, men may not require as many time management behaviors as they do not have as many roles to maintain.

*Hypothesis 1*: Females will engage in significantly more time management behaviors than males while also reporting significantly less perceived control of time.

As discussed previously, the time management measures need to be equivalent to test hypotheses such as this one because a comparison of group means is suggested. Therefore, items found to lack equivalence based on the combination of IRT and CFA analyses are removed and hypothesis testing continues with the reduced scale. The same process is applied to subsequent hypotheses and research questions concerning groups means.

**Age.**

Next, an analysis of differences in age and theoretical reasons for those differences is discussed. Performance on a given cognitive task is dependent on the underlying cognitive ability as well as an accumulation of knowledge and expertise in that domain (Hertzog, Kramer, Wilson, & Lindenberger, 2009). Individuals with higher levels of knowledge and experience are thus expected to perform better (Herzog et al., 2009). While certain cognitive abilities may decline as a function of age, the accumulation of compensatory skills and strategies obtained is expected to aid the individual in achieving goals in the same way a younger individual with no such decline and less experience would (Hertzog et al., 2009). An example is older rheumatoid patients remembering to take medications at higher rates than younger patients as a result of developing daily routines that support the remembering (Hertzog et al., 2009). The development of these routines to remember tasks is an example of prospective memory, which can be thought of as the memory of intentions (Crawford, Smith, Maylor, Sala, & Logie, 2003). Prospective memory and time management behaviors have been highly

positively correlated in the past (Macan, Gibson, & Cunningham, 2010). There is also some indication that older adults perform as well on prospective memory tasks as younger adults when they use aides and have time for planning (Shum, Cahill, Hohaus, O'Gorman, & Chan, 2013; McDaniel, Einstein, Stout, & Morgan, 2003). These tasks are similar or identical to the time management behaviors discussed previously. In fact, an age difference was noted on scores of the Structured Routine subfactor of the time structure questionnaire (TSQ), which includes items related to routines and planning (Bond & Feather, 1988). As a result, it appears there is evidence that older adults may engage in more time management behaviors than younger counterparts to compensate for age-related decline.

Social cognitive theory also lends support to this idea of older adults performing more time management behaviors than younger adults. The premise of the theory is that self-regulation occurs through three main subfunctions (Bandura, 1991). These include monitoring of one's behavior and the effect of said behaviors, comparison of these behaviors to self-standards, and affective reactions to these judgements (Bandura, 1991). Older adults have had the opportunity to experience more life events and circumstances than younger adults by a mere function of time. In addition, they have gone through the subfunctions discussed previously and determined which behaviors were effective in what circumstances. Therefore, older adults are likely to have determined which behaviors are most effective in helping them to achieve their goals in the time allotted to them. Meanwhile, there is some variability in the literature as to what constitutes someone in older age, especially in relation to older workers (Kooij, de Lange, Jansen, & Dikkers, 2007). Levinson, Darrow, Klein, Levinson, and McKee's (1978) developed a

theory of life development that may be useful in assessing individuals at various life stages. They suggest that individuals from the age of 20-40 are in early adulthood where they are concerned with developing personal identity and striving toward achievement (Ornstein, Cron, & Slocum, 1989). Individuals ranging from 41-60 years of age are considered to be in middle adulthood. These individuals are in a time of review where they are considering their own mortality, limits to achievement potential, and seeking greater stability (Ornstein et al., 1989). Finally, those over the age 60 are considered to be in late adulthood. In relation to working individuals, considering those over the age of 60 as later adulthood may be too narrow as they are very close to the age of retirement. Alternative categorizations of age (21-35 early, 36-50 middle, over 51 later) have been proposed and tested with some meaningful results related to job involvement (Hall & Mansfield, 1975; Rabinowitz & Hall, 1981; Ornstein et al., 1989). It appears from the research that it is meaningful to determine if the mean scores on time management measures differ across the established age categories discussed above.

*Hypothesis 2a*: Adults in late adulthood will score higher on time management behaviors than those in early adulthood.

*Hypothesis 2b:* Adults in late adulthood will score higher on time management behaviors than those in middle adulthood.

*Hypothesis 2c:* Adults in middle adulthood will score higher on time management behaviors than those in early adulthood.

**Temporal awareness.**

The popular phrase “time is money” reflects the idea that time is a valued commodity (Classens et al, 2009). Research would suggest that not all individuals view

their time as a resource, at least not in the same way they view money (Aeon & Aguinis, 2017). Soman (2001) conducted a series of experiments and found that people can budget money but not time. This implies that time is not viewed as a fixed resource in the same way as money (Aeon & Aguinis, 2017). This idea of time as a finite resource is called temporal awareness (Aeon & Aguinis, 2017). Low levels of temporal awareness will most likely undermine the individual's ability to manage time effectively (Aeon & Aguinis, 2017). Those high in temporal awareness may be more inclined to use time management behaviors in an effort to budget and track the time spent (Aeon & Aguinis, 2017). This method of budgeting may also lead to a better ability to manage the amount of activities they plan for in a day leading to higher levels of perceived control over time (Aeon & Aguinis, 2017). Individuals who work as consultants and those who earn an hourly wage are more likely to view time spent in monetary terms (Aeon & Aguinis, 2017; Devoe & Pfeffer, 2007). In an experiment, the individuals who were either paid hourly or instructed to calculate their hourly wage were less likely to engage in volunteer activities (Devoe & Pfeffer, 2007). The implication is that volunteering or engaging in non-paying activities is considered to be an opportunity cost (Devoe & Pfeffer, 2007). Contract workers were better able to calculate the opportunity cost of spending an hour or more with leisure or family time than an additional hour at work (Evan, Kunda, & Barley, 2004). That is, time not spent working was easy to calculate but it is difficult to put a monetary value on the enjoyment gained through leisure and family time. Individuals who are paid more or made to feel they are rich are more likely to feel pressed for time as well (Devoe & Pfeffer, 2011). This is thought to be a result of the higher economic value of time perceived by these individuals as a result of their perceived economic status

(Devoe & Pfeffer, 2011). This feeling of time pressure may then lead to less perceived control over time and less effective time management (Aeon & Aguinis, 2017). Another implication of Soman's (2001) experiments is the concept of the sunk-cost effect, which is the idea that people continue to invest money in activities that are not worthwhile based on the amount of money they already invested in the endeavor. Soman's (2001) experiments revealed that people do not view the sunk-cost effect in the same way with regard to time as they do money. When the participants were encouraged to value time in terms of monetary value (i.e., hourly rate), they were more likely to use the sunk-cost bias with time (Soman, 2001). An implication for time management is that increases in time management behaviors, such as a to-do list, may actually lead to less productivity or effectiveness as they fall prey to the sunk-cost bias (Aeon & Aguinis, 2017). In other words, when an individual sees they have spent 10 hours on a project that is yielding little productive results and likely should be re-evaluated or abandoned, they may be less likely to do so if they are viewing time in the same way as money. It is evident from the research, that there is no specific hypothesis that may be drawn concerning how individuals perceive their time and the use of time management. It is therefore likely that there is going to be a relationship between time management behaviors and the perceived control over time with how individuals view their time, but the direction and strength of that relationship is unclear.

*Research Question 3*: Will individuals who are higher in temporal awareness have significantly different responses to the time management measures than those who are lower in temporal awareness?

**Ideal Point Response Processes**

As previously discussed, the time management measures are scored using Likert-type response scales which is the typical scoring methodology used in the psychological sciences today. The prevalence of using Likert's approach is due to the relative simplicity of developing the scales and assessing their psychometric properties (Drasgow, Chernyshenko, & Stark, 2010). Likert-type scales are said to use the dominance response process, which means that an individual with a high level of a trait will likely respond with the higher level of response (i.e., Strongly Agree) on a positively worded item (Drasgow et al., 2010). This dominance response process is well suited to areas where ability is being assessed. Drasgow et al. (2010) use an example of a weight lifter who possesses more weight lifting ability having a higher probability of lifting the higher levels of weight. The same example can be extended to those who have varying levels of cognitive ability. Conversely, Drasgow et al. (2010) argue that dominance response models are not an accurate representation of those response processes that require introspection. That is, individuals need to reflect on perceptions of themselves and past experiences to respond to items measuring behaviors (Tay & Drasgow, 2012). In fact, recent research has shown that behaviors such as personality, attitudes, and interests are better represented by an ideal point response process (Tay & Drasgow, 2012). The ideal point model indicates that the probability of an individual endorsing an item is more likely when the item is relatively close to describing the individual's standing on the trait (Thurstone 1928; Tay & Drasgow, 2012). For instance, an individual could be extremely high on a trait but if the item is not worded to sound as extreme as they are, then they might not endorse that item. Thurstone (1928) proposed that ideal point response models

were more appropriate for self-reported behaviors, but the sample sizes and statistical processes needed to generate items were prohibitive at the time (Drasgow et al., 2010). Since that time, there have been advances in psychometrics and computer processing (Roberts, Donoghue, & Laughlin, 2000), as well as the ability to sample larger populations with subject pools such as Amazon's Mechanical Turk (MTurk). It is important to choose the appropriate measurement model (i.e., ideal point) because an incorrect model could lead to theoretical or statistical inferences that are misguided (Tay & Drasgow, 2012).

One area that has received a great deal of attention concerning the application of ideal point is personality. Stark, Chernyshenko, Drasgow, and Williams (2006) found that ideal point models demonstrated better model fit to the data than the dominance models. In fact, this study illustrated that those most extreme on a trait were better represented by the ideal point models (Stark et al., 2006). Carter, Dalal, O'Connell, and Kung (2014) were able to use the ideal point model to show that the personality trait conscientiousness has a curvilinear relationship with job performance. The rank ordering of individuals on the trait level was different in the ideal point model versus the dominance model. In addition, they were able to show that individuals selected by an organization based on the predicted performance utilizing ideal point methodologies resulted in better organizational outcomes (Carter et al., 2014). Given the variability in results with time management and performance, measures of time management are not currently used in selection systems (Aeon & Aguinis, 2017). However, if a more reliable foundation could be established, it may be a desirable attribute for organizations to use in selection.

There is some evidence that time management could be dispositional in nature and thus ideal for this avenue of research. A number of recent studies (i.e., Sheng-Tao & Yu-Ling, 2006; Zhijie, 2005) have begun exploring the possibility that a disposition for time management exists which underlies the use of time management behaviors (Claessens et al., 2009). Similarly, Shahani, Weiner, & Streit (1993) found that time management behavior was stable under varying levels of stress (Claessens et al., 2009) and scores on the TMBS did not change significantly over the course of the semester after controlling for academic pressure (Shahani et al., 1993) implying a dispositional nature to time management. Shahani et al. (1993) speculated that the perceived control of time reflects the dispositional component more than the other factors which reflect the "how to" of time management (Shahani et al., 1993). In addition, Pulford and Sohal (2006) found that students with high scores on conscientiousness, extraversion and organization also had higher scores on a time management scale and subsequently they had higher GPA scores than students not scoring as well on the time management scale (Claessens et al., 2009). This area of time management research is early and exploratory, so conclusive answers are unavailable at this time. Testing for response process may provide insight into this area of research; however, no such studies appear to exist at this time. As a result, the current study addresses this gap by checking for an improved model fit using the Generalized Graded Unfolding Model (GGUM; Roberts, Donoghue, & Laughling, 1998). The GGUM is an IRT model which was developed for the purpose of assessing ideal point response processes.

An additional reason for exploring the time management measures using the ideal point response model is the inconsistent internal consistency results of the time

management measures. As Claessens et al. (2007) note in their review of the literature, much variability exists in regard to the coefficient alphas reported and some of those alphas are reported at lower levels of acceptability. Given the measures are not strictly adhering to the assumptions of coefficient alpha, it may be that an ideal point response process is more applicable than the dominant response process. As a result, the current study sought to answer the following research question.

*Research Question 4*: Will the time management measures display better model fit with an ideal point response process than the dominant response process?

**The Current Study**

To date, there has been no investigation into how the time management measures operate across groups. It is important to understand how the items of a measure are viewed and how those items relate to the constructs they are intended to measure. This research is particularly important due to the concerns raised about the current measurement instruments of time management. In addition, this research addresses some of the gaps in the time management literature by determining if different patterns of results are observed across groups. This research could inform those who are designing time management trainings. That is, if all individuals do not use the same behaviors, a broader view for training may be required. Finally, this research furthers time management research by identifying whether the current measures of time management follow the traditional dominance response model or if they are better suited to the ideal point model.

# METHOD

## Participants

One thousand five hundred participants were recruited from Amazon's Mechanical Turk (MTurk). In order to qualify for the study, participants were required to be at least 18 years of age, English speaking, residents of the United States, and employed full-time. Participation was voluntary, and participants received payment of $1.00 for completing an online survey requiring approximately 15 minutes. The survey included five validation check items (i.e., Please respond "Never" to this item) to check for insufficient effort in responses. Ninety-six participants were removed for failing these checks or failing to complete the survey. In order to determine if participants were able to comprehend the details of the survey measures to answer adequately, a reading comprehension question was administered. This reading comprehension question was derived from Practice Test #1 of the College Board's SAT prep course (See Appendix for full question). Forty-nine participants were removed for failing to answer the reading comprehension question correctly. Another 20 participants were removed for completing the 137-item survey in less than five minutes. Additional analyses were conducted in the 3.5.2 version of R (R Core Team, 2018) were conducted to determine if participants were displaying sufficient effort and variance in their responses. First, the careless package (Yentes & Wilhelm, 2018) was used to determine if any individuals displayed longstring behaviors in item responses. Individuals with a longstring response would only use one response category (i.e., the first response of the scale) for multiple items in a row. There is no standard cutoff score for this analysis; however, recent guidance suggested using a string of responses greater than or equal to half the length of the total scale (Curran,

2016). For the current study, the TMBS is 29 items long while the other time management measures are 16 and 26 items for the TMQ and TSQ, respectively. However, the time management scales are displayed together on this questionnaire, so a cutoff of 15 consecutive items or more was selected for this study. Eighty-seven individuals were removed based on longstring responses of 15 or more. Next, a test for lack of variance was run using the dplyr package (Wickham, Francois, Henry, & Müller, 2018). A lack of variance would indicate that the spread of responses did not vary much from the mean, which given the range of possible responses for the multiple scales used would not indicate meaningful responses were given. There is no specific guidance indicated in the literature for a cutoff score. As such, a cutoff of .50 was determined to be a reasonable amount of variability. One individual with variance in responses less than .50 was removed. Finally, data were analyzed to determine if any individuals responded with two or less category responses. That is, any individual who uses only one or two responses to all items. No individuals were removed as a result of this analysis. Overall, 88 participants were removed for lacking appropriate variance in their responses.

The final sample included 1,247 participants. There were 547 male respondents (43.9%) and 694 female respondents (55.7%); 2 identified as other and 4 did not respond. Respondents were Caucasian (79.5%), African American (9.0%), Asian (5.1%), and Hispanic/Latin-American (4.7%); 1.8% were of other ethnicities. Survey respondents ranged in age from 18 to 73 years old ($M$ = 39.9 years, $SD$ = 10.6 years). Most participants had a college degree (49.8%) or some college/vocational training (29.2%). In addition, the majority of participants indicated they worked between 35 and 45 hours per week (78.5%). Participants reported working at their organization for less than a year and

up to 42 years (*M* = 7.8 years, *SD* = 6.7 years). Those individuals reported working in their current position for less than a year and up to 40 years (*M* = 6.1 years, *SD* = 5.9 years). In addition, participant's relationship status included those who were married (49.8%), single (34.6%), or living with a partner (13.5%).

**Measures**

Details for the scales used in this study can be found in the Appendix A. The internal consistencies (α) for each scale can be found in the parentheses on the diagonal of Table 1.

**Macan's (1994) Time Management Behavior Scale (TMBS).** The TMBS is a three-factor scale measuring time management behaviors. The factors are: goal setting and prioritizing (i.e., "I finish top-priority tasks before going on to less important ones"; 10 items); mechanics of time management (i.e., "I make a list of things to do each day and check off each task as it is accomplished"; 11 items); and preference for organization (i.e., "At the end of the workday, I leave a clear, well-organized work space"; 8 items). The three factors are measured with a rating scale ranging from (1) *seldom true* to (5) *very often true* with higher means indicating the degree to which individuals believe they use time management behaviors. An additional 5-item measure often administered in conjunction with the TMBS was included to measure the extent the participants feel they have control of time (i.e., "I feel in control of my time"). The rating scale ranges from (1) *seldom true* to (5) *very often true* with higher means indicating more perceived control. In a review of the time management literature, the TMBS factors were confirmed through confirmatory factor analysis and the TMBS was found to have convergent validity (Claessens et al., 2007). The Cronbach's Alpha for the goal setting, mechanics, and

preference for organization subscales of the TMBS were .86, .83, and .79, respectively, indicating good internal consistency of the scales. In addition, the perceived control of time scale had a somewhat low, while still generally acceptable, Cronbach's Alpha of .71.

**Britton and Tesser's (1991) Time Management Questionnaire (TMQ).** The TMQ is a three-factor scale measuring time management behaviors and attitudes toward time. The factors are: short-range planning (i.e., "Do you make a list of the things you have to do each day?"; 7 items); long-range planning (i.e., "Do you have a set of goals for the entire quarter?"; 5 items); and time attitudes (i.e., "Do you feel you are in charge of your own time, by and large?"; 6 items). Two items of the TMQ were removed from the current study because they were specific to a student population. The first item removed was from the long-range planning subfactor (Do you regularly review your class notes, even when a test is not imminent?). And the second item removed was from the time attitude subfactor (On an average class day do you spend more time with personal grooming than doing schoolwork?). The resulting measure for the current study includes seven items measuring short-range planning, four items measuring long-range planning, and five items measuring time attitudes. The three factors are measured with a 5-point rating scale: (1) *Never,* (2) *Infrequently*, (3) *Sometimes,* (4) *Frequently,* (5) *Always* with higher means indicating better time management practices. The Cronbach's Alpha for the short-range planning, long-range planning, and time attitudes subscales of the TMQ were .89, .19, and .61, respectively, indicating only the short-range planning subscale has good internal consistency. Given the extremely low internal consistency of the long-range

planning scale and problems identifying the CFA model with these items included in later testing, the items on the long-range planning scale will be eliminated from further testing.

**Bond and Feather's (1988) Time Structure Questionnaire (TSQ).** The TSQ consists of 26 items and measures the perceived use of time as structured and purposeful. Bond and Feather (1988) found five factors with 20 of the 26 items. Items two, six, 10, 17, 21, and 22 were not included in a factor. The five factors are: effective organization (4 items), sense of purpose (5 items), structured routine (5 items), present orientation (3 items), and persistence (3 items). Given all items of the scale did not fit into the identified factors, a total TSQ score will be considered in the current study in addition to the five subfactors. A 7-point scale ranging from *never* to *always* is used to determine an overall score ranging from 26-130 with a higher score indicating more structure and purpose for use of time. Exceptions include item 16, "Could you tell how many useful hours you put in last week?", which uses a scale ranging from *would have no idea* to *yes, definitely*; item 20, "Do your main activities during the day fit together in a structured way?" with endpoints ranging from *no structure at all* to *very structured*; item 21, "Do the important interests/activities in your life tend to change frequently?" with endpoints *change very frequently* and *my important interests are always the same*; and item 22, "Do your main interests/activities fulfill some purpose in your life?" with endpoints ranging from *no purpose at all* to *a great deal of purpose*. Test-retest reliability for the overall measure was reported at .76 during a 15-week period (Bond & Feather, 1988). The Cronbach's Alpha for the total TSQ scale was .90, indicating good internal consistency. In addition, the internal consistency for the effective organization, sense of purpose, structured

routine, present orientation, and persistence subscales were .81, .81, .68, .65, and .71, respectively.

**Smith, Sala, Logie, and Maylor's (2000) Prospective and Retrospective Memory Questionnaire (PRMQ).** The questionnaire is a self-report measure of prospective (i.e. do you decide to do something in a few minutes' time and then forget to do it?) and retrospective (i.e. do you forget something you were told a few minutes before?) memory failures in everyday situations. It contains 16 items and is measured on a 5-point scale ranging from (1) *never* to (5) *very often*. Crawford, Smith, Maylor, Della Sala, and Logie (2003) used confirmatory factor analysis to determine the model with the best fit consisted of a general memory factor including all items, as well as specific factors for prospective and retrospective memory. Kliegel and Jäger (2006) tested the PRMQ in conjunction with performance on actual prospective memory tests and found that the PRMQ is a valid predictor of actual prospective memory performance through the prospective memory subscale. They concluded that the PRMQ was a reliable and valid measurement tool for evaluating prospective memory performance. Macan, Gibson, & Cunningham (2010) established this scale has a strong, positive correlation to the time management scales (i.e., TMBS, TSQ). As a result, this measure was used to test group differences and eliminate memory as a contaminate to the time management differences that may be found in hypothesis testing. For the current study, the Cronbach's Alpha for the prospective and retrospective subscales were .87 and .83, respectively.

**Temporal Awareness.** Aeon and Aguinis (2017) note that there is a need for a measure of temporal awareness to help us determine whether this characteristic influences time management. To address this need, a measure of temporal awareness was

adapted from Soman's (2001) mental accounting of time and money. Soman (2001) developed this measure to understand whether time investments followed the principles of the mental accounting model in the same way monetary investments do. Eight statements (see Appendix A) with either time or money as the subject create 16 statements overall. Participants report the extent of agreement with each statement on a 9-point scale (1=strongly disagree, 5=neither agree nor disagree, 9=strongly agree). Soman (2001) calculated the mean agreement with the statements related to money and the mean agreement with the statements related to time. The statements regarding money had a higher mean agreement value than those with statements regarding time. Soman (2001) concluded that the mental accounting model was not as valid for expenditures of time as it was for monetary expenditures. The current study used these statements to create a measure of temporal awareness. The 8 statements with money were separated on the survey from the 8 statements concerning time so as not to prime a response for money or time. Cronbach's Alpha for the money and time scales were .81 and .76, respectively. A matched-pairs-t-test using the item stems (i.e., money) as the pairs was used to establish difference scores between the time and money statements. Each participant had a t-statistic calculated that was compared to a critical value to determine if there was a significant difference. A significant difference was considered indicative of a person who values money as a resource more so than time. Those without significant differences were considered indicative of a person who values money and time relatively the same. Dummy variables were created to represent the group that is high in temporal awareness (those that view money and time relatively the same in terms of a resource) and those that are low on temporal awareness (those that view money as a resource more so than time).

There were 927 and 280 individuals in the high and low temporal awareness categories, respectively. Previous research seems to indicate that the amount of people low in temporal awareness would be greater than those higher in temporal awareness; however, the previous research is limited. To date, it appears that the current study is the only one to directly compare mean differences on the money versus time statements; however, the study conducted by Soman (2001) indicated more mean agreement with the money statements than time statements. Based on existing research, it was also considered unlikely that there would be a group of individuals that value time as a resource more than money (Soman, 2001; Aeon & Aguinis, 2017). However, in the current study, there were 40 individuals with a significant negative difference (indicating that these individuals agreed with the time statements more so than the money statements). The effect sizes for these scores were mostly small with a few considered a medium effect. Given the small number of individuals in this group and the lack of theoretical reasoning for why this group may be different than those in the high temporal awareness group, they were collapsed into the high temporal awareness group. All analyses were conducted without the higher temporal awareness group as well. Results were substantially the same for all analyses with the exception of the configural model of the perceived control of time scale and persistence scale of the TSQ failing to converge during measurement equivalence testing. As a result, analyses are reported with the combined group of high and higher temporal awareness consisting of 967 individuals.

**Career Stage.** Career stage was used as a control during Hypothesis 2 testing. Perrone, Gordon, Fitch, and Civiletto (2003) Adult Career Concerns Inventory was used to measure the career stage of participants. Based on Super's (1990) theory of career

development, there are four possible career stages: exploration, establishment, maintenance, and decline. The scale consists of 12 items (three for each stage) where participants are asked to indicate the level of concern they currently have for each of the tasks. An example item is: "finding the line of work that I am best suited for." Responses are measured on a 5-point scale ranging from *no concern* to *great concern.* The Cronbach's Alpha for the exploration, establishment, maintenance, and decline scales were .92, .83, .84, and .73, respectively. In addition to this scale, participants were asked their tenure at their organization as some researchers (Gould & Hawkins, 1978; Mount, 1984) have used this method to determine career stage.

**Conscientiousness.** Conscientiousness was used as a control when testing Hypothesis 2. Four items from Donnellan, Oswald, Baird, and Lucas (2006) mini-IPIP scale were used. Participants are instructed to indicate how accurately a statement describes them and responses are measured with a 5-point scale ranging from *not at all* to *very much.* An example item is: "get chores done right away." The internal consistency score for this scale was .77.

**Job Complexity.** Job complexity was used as a control when testing Hypothesis 2. The Zacher and Frese (2011) adapted version of Semmer (1982) job complexity scale is used in the current study. The scale consists of four items measured with a 5-point scale from *very little* to *very much.* An example item is: "do you receive tasks that are extraordinary and particularly difficult?" This scale had an internal consistency score of .76.

**Life Stage/Age.** In order to test ME through CFA, DIF and DTF, and Hypothesis 2 concerning age, it is necessary to divide individuals into groups. Age categories

developed by Hall and Mansfield (1975) based on Levinson et al.'s (1978) model of life development were used to divide participants into three categories: early adulthood (18-35); middle adulthood (36-50); and later adulthood (over 50). Equivalence testing was adjusted to perform across groups: early versus middle; middle versus later; early versus later.

**Demographics/Qualitative.** Questions concerning gender, race, education level, relationship status, hours worked, and factors influencing the ability to manage time were asked at the end of the survey.

## RESULTS

### Preliminary Analysis

Before analyzing the data, assumptions for multivariate normality were tested using Mahalanobis Distance. Two hundred and fourteen multivariate outliers were discovered. Analyses were conducted with and without the outliers and there were no substantial differences noted. As a result, all analyses are reported on the full dataset of 1,247 participants. Descriptive statistics are provided in Table 1. Overall, participants reported time management behaviors via the TMBS and TMQ in the mid- to high range. Results for the structure of time via the TSQ fell mostly in the mid-range with the exception of the present orientation scale which was at the higher range. Lower scores on the prospective and retrospective memory scales indicate less failures and thus better memory. Overall, participants considered themselves to have good memories. Results for the career stage indicated scores in the mid-range for the exploration, establishment, and maintenance stages, while the decline stage was closer to the high range. Overall, participants reported a high level of conscientiousness and job complexity.

A correlation matrix is displayed on Table 1. Overall, results are similar to those found in previous research where memory is significantly correlated to most of the time management scales (Macan et al., 2010). In addition, the time management scales are significantly correlated to each other, but not so highly correlated that they appear to be measuring the same thing. Meanwhile, an odd finding is that the TSQ has a negative correlation to the other time management measures. This finding is not consistent with previous research (Macan et al., 2010; Shahani et al., 1993). As a result, the findings related to the TSQ for the current study should be interpreted with caution. As expected, career stage was significantly correlated with age. In addition, career stage was significantly correlated with memory and job complexity.

**Item Response Theory**

With IRT modeling, the individual's underlying trait level is represented by the Greek letter theta (θ) and the item's location is represented by the letter *b* (Embretson & Reise, 2000). "An IRT model is selected for each item to determine the item response function, or *trace line*, given θ" (Chalmers, Counsell, & Flora, 2016). As described previously, Samejima's (1969) graded response model (GRM) was used to conduct IRT analyses given its ability to handle polytomous responses. The GRM assumes a probability function, the option response function (ORF), which is characterized by a discrimination parameter represented by the letter *a* and several location parameters represented by the letter *b* (Raju et al., 2002). Each item will have one discrimination parameter (*a*) and location parameters (*b*) equal to the number of ordered response categories (*k*) minus 1 (Raju et al., 2002). So, for a measure that has 5 response options (i.e., 1=*strongly disagree* to 5=*strongly agree*), there would be 4 location parameters for

each item. The location parameter represents the probability of an individual endorsing an item given their location on the trait level (Embretson & Reise, 2000). The discrimination parameter represents the slope of the function and illustrates how well the item differentiates between individuals residing at different levels of the trait (Embretson & Reise, 2000). From here, the actual option response probabilities or option response functions (ORFs) can be calculated (Raju et al., 2002; Embretson & Reise, 2000). The ORFs represent the likelihood that an individual will respond in a particular category given a certain trait level (Embretson & Reise, 2000).

**Item-level fit.**

Analyses were conducted in the 3.5.2 version of R (R Core Team, 2018) using the mirt package version 1.3 (Chalmers, 2012). Table 2 presents fit statistics for all subfactors of the time management scales. It is recommended to assess fit using the chi-squared statistic to degrees of freedom ratio due to the chi-squared statistics sensitivity to larger sample sizes (Drasgow & Hulin, 1990). A ratio of less than 3 is considered acceptable fit while a ratio of less than 2 is considered excellent fit (Drasgow & Hulin, 1990). Based on these cutoffs, most items tested were found to have acceptable to excellent fit by the GRM. Item six of the TMBS goal setting and prioritizing scale and all items in the perceived control of time scale, except item three, exceeded the cutoff. The root mean square error of approximation (RMSEA) is also reported in Table 2. Maydeu-Olivares (2013) advise that a RMSEA cutoff less than or equal to .05 indicates an adequate fit. The RMSEA for these items meet that criteria and it appears that they fit the data adequately to proceed. However, results concerning these items may still be interpreted with caution. All items of the TMQ, except six and seven of the short-range

planning subfactor, exceeded the cutoff. In addition, the RMSEA was greater than .06 for items four and five of the time attitude subfactor. As such, further analyses with the time attitudes subscale of the TMQ will consider these items with caution. None of the items on the TSQ appear to fit the data well. Testing conducted with the TSQ will be considered with caution.

**Differential item functioning.**

Using the IRT framework, items are considered to have measurement equivalence when the item parameters do not differ across groups. An item that is equivalent would have equal ORFs for the two groups (Raju et al., 2002). When an item is not equivalent across groups, it is referred to as differential item function (DIF; Embretson & Reise, 2000). In the context of the current study, DIF assumes two distinct groups (i.e., male vs female) and they are referred to as the reference and focal groups (Embretson & Reise, 2000). There are many IRT-based statistical approaches for detecting DIF and a complete accounting of these approaches is beyond the scope of this paper. The current study used the Lord's chi-squared DIF method (Lord, 1980) and DFIT framework (Flowers, Oshima, & Raju, 1999; Raju, van der Linder, & Fleer, 1995). The lordif version 0.3.3 and DFIT version 1.0.3 packages in R were used to perform the analyses (Choi, Gibbons, & Crane, 2011; Cervantes, 2017). In order to test for DIF, it is necessary to use a process called linking to put the separate calibrations on a common scale (Oshima & Morris, 2008). A set of anchor items which do not contain DIF are necessary to perform the linking process (Oshima & Morris, 2008). Since it is unknown which items do not contain DIF before the DIF analysis, two-stage linking has been recommended (Oshima & Morris, 2008). As such, the current study followed this two-stage process where the scales were

initially linked using all items as anchors and subsequently with the non-DIF items (Oshima & Morris, 2008). The lordif package identifies items displaying significant DIF for review. In addition, the DFIT statistics utilize the item parameter estimates established from an IRT model such as the GRM. One of the advantages of the DFIT framework is that it can be used to identify DTF as well as DIF (Cervantes, 2017). By combining these analyses, it is possible to get a clearer picture of how the DIF items are affecting the entire scale or subscale and make a determination of whether those items should be removed for further testing. For the purposes of this study, items identified as necessary for removal for DIF/DTF testing will also be considered during the CFA testing below. A determination will be made from the combination of these analyses which items will be retained for hypotheses testing. A summary of the items determined necessary for removal based on this combination of analyses is displayed in Table 27.

***Gender.*** Four individuals did not indicate their gender and two individuals responded as 'other.' For the purposes of differential functioning testing across gender, a subset of the data including only those individuals indicating they were either male or female was generated. The subset included 1,241 participants (male = 547; female = 694).

For the goal setting and prioritizing subfactor of the TMBS, items four, eight, and nine were flagged as displaying statistically significant DIF. These results are reported in Table 3. In addition, the DTF was .164, which exceeds the cutoff of .096 generally accepted for a five-category response scale (Schmit, Kihm, & Robie, 2000). Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was .000. For the mechanics subfactor of

the TMBS, items four, five, seven, eight, and ten were identified as displaying significant DIF. See Table 3 for results. In addition, the DTF was .119, which is large and exceeds the cutoff amount. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .022, which is a small amount. For the preference for organization subfactor of the TMBS, no items displayed significant DIF and the DTF was .001, which is very small. For the perceived control of time scale, item five was identified as displaying significant DIF. However, the DTF was only .042, which is below the threshold of .096.

For the short-range planning subfactor of the TMQ, items four, five, and seven were identified as displaying significant DIF. See Table 3 for results. In addition, the DTF was .482, which far exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .012, which is small. For the time attitudes subfactor of the TMQ scale, items one and four were identified as displaying significant DIF. See Table 3 for results. However, the DTF was only .032, which is a small amount and below the .096 threshold.

For the effective organization subfactor of the TSQ scale, items two and three were identified as displaying significant DIF. See Table 3 for results. However, the DTF was only .030, which is a small amount. For the structured routine and sense of purpose subfactors of the TSQ, no items displayed significant DIF and the DTF was .015 or less. The analyses were not able to be run on the present orientation and persistence subfactors of the TSQ because they only contain three items and the lordif package requires the number of items to be four. Determinations about these scales rely on the CFA analyses.

Overall, these tests across gender revealed some level of differential item functioning for some of the subfactors of the time management measures. After scrutinizing the items further during the confirmatory factor analysis, it is likely that items from the goal setting and prioritizing and mechanics subfactors of the TMBS, and the short-range planning subfactor of the TMQ will need to be removed before testing Hypothesis 1.

***Age.*** One individual did not indicate their age. For the purposes of differential functioning testing across age, a subset of the data excluding this individual was created. The subset included 1,246 participants (early adulthood = 498; middle adulthood = 515; later adulthood = 233). Equivalence testing is best conducted across two groups while three age groups are of interest in the current study. As a result, testing was adjusted to perform across each of the groups by testing early versus middle, middle versus later, and early versus later.

*Early versus middle.* For the goal setting and prioritizing subfactor of the TMBS, item seven was identified as displaying significant DIF. Results are reported in Table 4. However, the DTF was only .024, which is small and below the threshold of .096. For the mechanics subfactor of the TMBS, item six was identified as displaying significant DIF (results reported in Table 4). In addition, the DTF was .198, which exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .043, which is moderate and less than the threshold. For the preference for organization subfactor of the TMBS, items two, three, and seven were identified as displaying significant DIF. Results are reported in Table 4. In addition, the DTF was .166, which is

large and exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .012, which is a very small amount of DTF. For the perceived control of time scale, item three (reported in Table 4) was identified as displaying significant DIF; however, the DTF was only .038, which is a small amount.

For the short-range planning subfactor of the TMQ, items four, six, and seven were identified as displaying significant DIF. Results are reported in Table 4. However, the DTF was only .065, which is a moderate amount. For the time attitudes subfactor of the TMQ scale, there were no items identified as displaying significant DIF and the DTF was .003, which is very small.

For the effective organization, structured routine, and sense of purpose subfactors of the TSQ, no items displayed significant DIF and the DTF was .014 or less. The analyses were not able to be run on the present orientation and persistence subfactors of the TSQ because these scales contain three items and the analyses require four items. Determinations about these scales will rely on the CFA analyses.

Overall for the early versus middle age groups, several items were identified as displaying significant differential item functioning. However, only a few subfactors displayed differential test functioning. Essentially, these items may be performing differently across this age group while not affecting the overall score on the subfactor, which is the interest of this study. As a result, after considering the CFA results below, only the mechanics and preference for organization subfactors of the TMBS will have items removed before proceeding with Hypothesis 2.

*Middle versus later.* For the goal setting and prioritizing subfactor of the TMBS, there were no items identified as displaying significant DIF and DTF was .016, which is a small amount. For the mechanics subfactor of the TMBS, items one and three were identified as displaying significant DIF. Results are reported in Table 5. In addition, the DTF was .143, which is large and exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .069, which is moderate and less than the threshold. For the preference for organization subfactor of the TMBS, items four and seven were identified as displaying significant DIF (see Table 5). In addition, the DTF was .400, which is very large and exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .001, which is very small. For the perceived control of time scale, item three was identified as displaying significant DIF; however, the DTF was a moderate .062, which is less than the threshold of .096.

For the short-range planning and time attitudes subfactors of the TMQ, there were no items identified as displaying significant DIF and the DTF was .036 and .023, respectively, which are small amounts.

For the effective organization and structured routine subfactors of the TSQ, no items displayed significant DIF and the DTF was .008 or less. For the sense of purpose subfactor of the TSQ, item three was identified as displaying significant DIF, but the DTF was only .021, which is a small amount. The analyses were not able to be run on the present orientation and persistence subfactors of the TSQ because they only contain three

items and the analyses require four items. Determinations about these scales will rely on the CFA analyses.

Overall for the middle versus later age groups, several items were identified as displaying significant DIF while also culminating to noteworthy differential test functioning. As a result, after considering the CFA results below, items from the mechanics and preference for organization subfactors of the TMBS will be removed before testing Hypothesis 2.

*Early versus later.* For the goal setting and prioritizing subfactor of the TMBS, item eight was identified as displaying significant DIF and the DTF was .086, which is moderately large but does not exceed the threshold of .096. Results are reported in Table 6. For the mechanics subfactor of the TMBS, items three, seven, and ten were identified as displaying significant DIF (see Table 6). In addition, the DTF was .977, which is very large. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified as displaying significant DIF and the DTF was reduced to .017, which is a small amount. For the preference for organization subfactor of the TMBS, items two, four, and seven were identified as displaying significant DIF. Results are reported in Table 6. In addition, the DTF was .311, which is very large and exceeds the threshold of .096. Those items were removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .010, which is very small. For the perceived control of time scale, item three was identified as displaying significant DIF (see Table 6) and the DTF was .151, which is large. Those items were removed from the dataset and the DIF and

DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .004, which is very small.

For the short-range planning subfactor of the TMQ, items two, four, five, six, and seven were identified as displaying significant DIF and the DTF was .436. Results are displayed in Table 6. Eliminating all of these items would create a two-item scale which is generally not advised. Partial equivalence testing as part of the CFA testing below will be used to determine which items should be retained for hypotheses testing. For the time attitudes subfactor of the TMQ, item one was identified as displaying significant DIF (see Table 6) and DTF was .176, which is large and exceeds the threshold of .096. Item one was removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and DTF was reduced to .031, which is a small amount.

For the effective organization and structured routine subfactors of the TSQ, no items displayed significant DIF and the DTF was .005 and .003, respectively, which are very small amounts. For the sense of purpose subfactor of the TSQ, item four was identified as displaying significant DIF, but the DTF was only .023, which is a small amount. The analyses were not able to be run on the present orientation and persistence subfactors of the TSQ because they only contain three items and the analyses require four items. Determinations about these scales will rely on the CFA analyses.

Overall for the early versus later age categories, many items were identified as displaying significant DIF while also displaying differential test functioning. The mechanics and preference for organization subfactors of the TMBS, the perceived control of time scale, and the short-range planning and time attitudes subfactors of the TMQ all have items that will need to be removed before proceeding with testing Hypothesis 2. The

exact items will need to be determined in the CFA testing below. This is especially true in relation to the short-range planning subfactor of the TMQ as it had all but two items displaying significant amounts of DIF.

***Temporal Awareness.*** All individuals responded to the items necessary to determine the temporal awareness level and the full data set is used for the differential functioning testing concerning temporal awareness. Testing is conducted across low (n = 280) and high (n = 967) levels of temporal awareness as described in the methods section.

For the goal setting and prioritizing subfactor of the TMBS, item three was identified as displaying significant DIF (see Table 7); however, the DTF was only .023, which is a small amount and below the threshold of .096. For the mechanics subfactor of the TMBS, no items were identified as displaying significant DIF (see Table 7) and the DTF was only .004, which is very small. For the preference for organization subfactor of the TMBS, item seven was identified as displaying significant DIF. Results are reported in Table 7. In addition, the DTF was .101, which exceeds the cutoff of .096. This item was removed from the dataset and the DIF and DTF analyses were re-run. As a result, no items were identified with DIF and the DTF was reduced to .004, which is very small. For the perceived control of time scale, no items were identified as displaying significant DIF and the DTF was only .003, which is very small.

For the short-range planning subfactor of the TMQ, item four was identified as displaying significant DIF (see Table 7); however, the DTF was only .068, which is a moderate amount but under the threshold of .096. For the time attitudes subfactor of the TMQ, there were no items identified as displaying significant DIF and the DTF was .004, which is very small.

For the effective organization subfactor of the TSQ, items three and four were identified as displaying significant DIF. Results are reported in Table 7. In addition, the DTF was .109, which is large and exceeding the cutoff amount. Eliminating these items would create a two-item scale which is generally not advised. Partial equivalence testing as part of the CFA testing below will be used to determine which items should be retained for hypotheses testing. For the sense of purpose and structured routine subfactors of the TSQ, no items displayed significant DIF and the DTF was .034 and .006, respectively, which are small and very small. The analyses were not able to be run on the present orientation and persistence subfactors of the TSQ because they are three-item measures and four items are required for analyses. Determinations about these scales will rely on the CFA analyses.

For testing across levels of temporal awareness, overall, the results show that there are a few items displaying significant DIF. However, only two scales displayed DTF: the mechanics subfactor of the TMBS and the effective organization subfactor of the TSQ. Results of the CFA testing below will aide in determining if these items should be removed for testing of Research Question 3.

**Confirmatory Factor Analyses**

All confirmatory factor analyses (CFA) were run using RStudio version 1.1.463 using the lavaan package (Yves, 2012).

**Model fit.**

Before testing for measurement equivalence, model fit for the subfactors of each measure of time management was assessed. Results are reported in Table 8. The goal setting and prioritizing subfactor of the TMBS did not fit the data well ($\chi^2$ (35) = 668.65,

$p < .001$, RMSEA = .120 [90% CI = .113, .129], CFI = .85, SRMR = .06). Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items eight (*I review my daily activities to see where I am wasting time*) and nine (*During a typical day I evaluate how well I am following the schedule I have set down for myself*) to correlate created a significantly improved model. Analysis of the item content of these items revealed they are primarily dealing with following a set schedule and the avoidance of wasted time while other items within this scale deal with prioritizing and setting goals more specifically. As a result, the modification was retained, and the CFA measurement equivalence testing was performed using this modification. The mechanics subfactor of the TMBS did not fit the data well ($\chi^2$ (44) = 558.09, $p < .001$, RMSEA = .097 [90% CI = .090, .104], CFI = .86, SRMR = .06). Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items five (*I write notes to remind myself of what I need to do*) and six (*I make a list of things to do each day and check off each task as it is accomplished*) and one (*I carry a notebook or use my phone to jot down notes and ideas*) and seven (*I carry an appointment book with me or use my phone to keep track of appointments*) to correlate created a significantly improved model. Analysis of the item content of items five and six reveals that they both indicate the use of a to do list while items one and seven both refer to the use of a notebook or phone as an aide. Meanwhile, other items for this measure vary from each other in their wording and type of activity. As a result, the modifications were retained, and the CFA measurement equivalence testing were performed using these modifications. The preference for organization subfactor of the TMBS ($\chi^2$ (20) = 266.34, $p < .001$, RMSEA = .099 [90% CI

= .089, .110], CFI = .90, SRMR = .05) and the perceived control of time (PCT) scale often run in conjunction with the TMBS displayed good model fit ($\chi^2$ (5) = 52.78, $p$ < .001, RMSEA = .088 [90% CI = .067, .110], CFI = .95, SRMR = .04).

The short-range planning subfactor of the TMQ displayed good model fit ($\chi^2$ (14) = 381.13, $p$ < .001, RMSEA = .145 [90% CI = .133, .158], CFI = .93, SRMR = .06), while the model for the long-range planning subfactor of the TMQ could not be identified. Given this finding and the extremely low Cronbach's Alpha in reliability testing, the long-range planning subfactor will not be included in further analysis. The time attitudes subfactor of the TMQ did not fit the data well ($\chi^2$ (5) = 167.65, $p$ < .001, RMSEA = .162 [90% CI = .141, .183], CFI = .78, SRMR = .07). Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items two (*Do you feel you are in charge of your own time, by and large?*) and four (*Do you make constructive use of your time?*) to correlate created a significantly improved model. However, analysis of the items did not reveal any noticeable similarity in these items versus others in this subfactor. As a result, the modification will not be retained for CFA measurement equivalence testing and results should be viewed with some caution.

The effective organization and sense of purpose subfactors of the TSQ displayed good model fit. See Table 8 for results. The present orientation and persistence subfactors were saturated and goodness of fit tests were not available. The structured routine subfactor of the TSQ did not fit the data well ($\chi^2$ (5) = 176.66, $p$ < .001, RMSEA = .166 [90% CI = .145, .187], CFI = .85, SRMR = .07). Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of

two items to correlate created a significantly improved model. However, analysis of the item content of these items indicated they were not more similar to each other than other items within this scale, so the modification was not retained. CFA measurement equivalence testing for this scale should be viewed with caution as a result.

**Measurement equivalence.**

The CFA measurement equivalence analyses followed the procedures outlined by Vandenberg and Lance (2000) and described previously. Sequential models of configural, metric, scalar, strict, and structural equivalence were established. Each model was compared to the previous model using the chi-square difference test. Difference in fit measures were also analyzed as chi-square tests are prone to influence from larger samples and should be assessed along with other fit measures (Schmitt & Kuljanin, 2008). Vandenberg and Lance (2000) recommend chi square along with Bentler (1990) comparative fit index (CFI) for comparing models.

***Gender.*** Four individuals did not indicate their gender and two individuals responded as 'other.' For the purposes of measurement equivalence testing across gender, a subset of the data including only those individuals indicating they were either male or female was generated. The subset included 1,241 participants (male = 547; female = 694). Results of the measurement equivalence testing across gender are displayed in Table 9.

For the goal setting and prioritizing subfactor of the TMBS, the chi-square difference test between scalar and metric models was significant which could indicate there was a systematic response bias across the genders. Cheung and Rensvold (2002) recommend using a change in CFI of less than or equal to .01 as an indication that the

measure should be considered equivalent, and the difference between these models was .01. Previously, the DIF analysis indicated items four, eight, and nine exhibited DIF. Meade and Lautenschalager (2004) suggest that IRT analyses may be more desirable when equivalence of a single scale is of interest due to the additional parameters estimated as part of the IRT methods. However, not all studies have the adequate sample size to support IRT methods. They go on to suggest that a combination of the approaches may be ideal when the adequate sample size is achieved in order to further the research in this area (Meade & Lautenschalager, 2004). As a result, the current study continued with CFA analyses on this scale by using partial equivalence testing to determine if those items identified in the DIF analyses would also be indicated as causing variance in the CFA analyses. Partial equivalence testing was conducted using the semTools package in R (Jorgensen, Pornprasertmanit, Schoemann, & Rosseel, 2018). The likelihood-ratio test comparing the most restricted model and the same model with constraints relaxed individually was used to identify items causing variance. Those items that were identified as providing significant results on this test are the items of concern. By conducting partial equivalence testing on the goal setting and prioritizing subfactor, it was determined that items three, four, and eight had significant results based on $p < .05$. In further review of the partial equivalence test, item eight is significant at the $p < .001$ level and thus appears to be the leading cause of the variance. As a result, only item eight was removed and the test for equivalence was run again. The chi-square difference test was no longer significant and the change in CFI was improved. The measure showed equivalence across gender with the removal of item eight alone. In addition, DIF and DTF analyses were re-run with only item eight removed and resulted in no items identified as demonstrating

DIF and DTF was virtually null. Hypotheses testing will proceed across gender with the goal setting and prioritizing subfactor minus item eight.

For the mechanics subfactor of the TMBS, the chi-square difference tests between scalar and metric, strict and scalar, and structural and strict models were significant. In addition, the change in CFI exceeded .01 for each of these tests. By conducting partial equivalence testing for the scalar model, it was determined that items four, seven, and ten were causing the variance at the $p < .05$ level and items five and eight were causing the variance at the $p < .001$ level. Partial equivalence testing of the strict model revealed items three and four causing the variance at the $p < .05$ level and item nine was causing the variance at the $p < .001$ level. Review of the DIF testing results indicate that only items four, five, seven, eight, and ten were identified as displaying DIF. Those items displaying DIF were removed and the CFA measurement equivalence testing was conducted again. The chi-square difference tests between strict and scalar models remained significant and the change in CFI continued to exceed .01. As a result, items three and nine were also removed and the test for equivalence was run again. The chi-square difference test was no longer significant and the change in CFI no longer exceeded .01 for the strict versus scalar models. Hypotheses testing across gender with the mechanics subfactor will proceed with the equivalent items one, two, six, and eleven only.

For the preference for organization subfactor of the TMBS, the chi-square difference test between metric and configural and structural and strict models were significant. However, the change in CFI did not exceed .01 for these tests. In addition, there were no items identified as displaying DIF in previous testing. As a result, the

preference for organization subfactor should be considered equivalent across gender. The perceived control of time scale was found to be equivalent at each level of testing across genders.

For the short-range planning subfactor of the TMQ, the chi-square difference tests between scalar and metric, strict and scalar, and structural and strict models were significant. The changes in CFI did not exceed .01 for any of these tests. However, the change in CFI for the scalar versus metric models was at .01 and items four, five, and seven were identified as displaying DIF in previous testing. As a result, partial equivalence testing was conducted and items four and five were identified as the apparent cause of the variance based on $p < .001$ significance level. Those items were removed and the test for equivalence was run again. As a result, the chi-square difference test remained significant, but the change in CFI was reduced. In addition, the DIF analysis was performed again with the removal of only items four and five. As a result, no items were identified as displaying DIF and the DTF was reduced to .01, which is very small. Hypotheses testing across gender with the short-range planning subfactor of the TMQ will be conducted without items four and five. For the time attitudes subfactor of the TMQ, the chi-square difference test between scalar and metric models was significant. In addition, the change in CFI exceeded .01 for this test. By conducting partial equivalence testing, it was determined that item four was causing the variance at the $p < .001$. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01 for the scalar versus metric models. Item four was also identified as displaying DIF in

previous testing although the DTF was only .032. As a result, the time attitudes subfactor will be used for gender hypothesis testing without item four.

For the effective organization subfactor of the TSQ, the chi-square difference tests between scalar and metric, and strict and scalar models were significant. In addition, the change in CFI was .01 for both tests. Items two and three were identified as displaying DIF in previous testing, although the DTF was only .030. Partial equivalence testing was conducted to investigate these differences further. It was determined that item two was causing the variance at the $p < .005$ level for the scalar versus metric test and items one and two were causing the variance at the $p < .005$ level for the strict versus scalar test. As item two was identified in multiple tests, it was removed and the test for equivalence was run again. As a result, the chi-square difference test remained significant, but the change in CFI no longer exceeded .01. As a result, the effective organization subfactor should be considered equivalent with the exclusion of item two. For the sense of purpose subfactor of the TSQ, the chi-square difference test between the metric and configural, and strict and scalar models were significant. However, the change in CFI did not exceed .01 for either of these tests. In addition, there were no items identified as displaying DIF in previous testing. As a result, the sense of purpose subfactor should be considered equivalent across gender.

For the structured routine subfactor of the TSQ, the chi-square difference tests between scalar and metric, strict and scalar, and structural and strict models was significant. In addition, the change in CFI exceeded .01 for the strict versus scalar models and was .01 for the scalar versus metric models. By conducting partial equivalence testing, it was determined that items two and three were causing the variance at the *p*

< .05 level for the scalar versus metric testing and at the $p < .001$ level for the strict versus scalar testing. These items were removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01 for the strict versus scalar models. As a result, the structured routing subfactor should not include items two and three when testing mean differences across gender. The present orientation subfactor of the TSQ was found to be equivalent at each level of testing across genders. For the persistence subfactor of the TSQ, the chi-square difference test between the scalar and metric, and strict and scalar models were significant. In addition, the change in CFI was .01 for both of these tests. Given this finding and the inability to test this measure with IRT methods, partial equivalence testing was conducted to investigate the measure further. Items one and three were identified as causing variance at the $p < .05$ level and items was causing variance at the $p < .005$ level for the scalar versus metric models. Item two was also identified as causing variance at the $p < .05$ level for the strict versus scalar model testing. Re-running the analyses without item two resulted in a model that would not converge. Given this measure met the bare requirements for moving forward with testing, the persistence subfactor will be used in hypothesis testing for gender with caution.

Based on the combination of IRT and CFA analyses, it was determined which items needed to be removed for hypothesis testing in regards to gender. For the goal setting and prioritizing subfactor of the time management behavior scale (TMBS), it was determined that item eight was not equivalent across genders. In addition, testing on the mechanics subfactor of the TMBS revealed that items three, four, five, seven, eight, nine, and ten were not equivalent across genders. Conversely, the preference for organization

subfactor of the TMBS and the perceived control of time scale were found equivalent across genders. Testing on the short-range planning subfactor of the TMQ revealed that items four, five, and seven were not equivalent. In addition, item four was not equivalent for the time attitudes subfactor. Finally, measurement equivalence testing revealed that the second item of the effective organization subfactor and the second and third items of the structured routine subfactor were not considered equivalent across genders. The sense of purpose and present orientation subfactors were found to be equivalent. The persistence subfactor was found equivalent based on the recommendations of the literature; however, partial equivalence testing was performed since the IRT analysis was unable to be conducted on this subfactor. The second appeared to be displaying some variance, but the CFA model without that item did not converge. When tests of mean differences across gender are conducted with this subfactor, interpretations may need to be made with caution. For the current study, the nature of the TSQ subfactors and items of the TSQ are not conducive to testing Hypothesis 1 so this line of testing was for informational purposes primarily.

To determine if construct coverage was compromised with the removal of these items, CFA was run on each subfactor with the items removed. With the exception of the time attitudes subfactor of the TMQ, all subfactors had the same or better model fit than the model fit previously conducted with all items. As a result, it appears there is adequate construct coverage to test Hypothesis 1. The time attitudes subfactor of the TMQ will be used in testing, but results should be interpreted with caution.

***Age.*** One individual did not provide their age and a subset of the data excluding that individual was created for testing measurement of equivalence across age groups.

Individuals were divided into the age categories of early adulthood (18-35), middle adulthood (36-50), and later adulthood (over 50) as outlined previously. There were 498 individual categorized as early adulthood, 515 categorized as middle adulthood, and 233 categorized as later adulthood. Equivalence testing is best conducted across two groups while three age groups are of interest in the current study. As a result, testing was adjusted to perform across each of the groups by testing early versus middle, middle versus later, and early versus later.

*Early versus middle.* Results for the measurement equivalence testing of the early versus middle groups are displayed in Table 10. For the goal setting and prioritizing subfactor of the TMBS, the chi-square difference tests between scalar and metric, and strict and scalar models were significant for the early versus middle group. However, the change in CFI did not exceed .01 for any of these tests. For the mechanics subfactor of the TMBS, the chi-square difference tests between all models were significant for the early versus middle group. However, the change in CFI was less than .01 for all of these tests. Previously, the DIF testing identified item six as displaying DIF and the DTF was .198. However, given the results of the CFA measurement equivalence testing, the mechanics subfactor will be considered equivalent and hypothesis testing will include all the items for the early versus middle age group testing. For the preference for organization subfactor of the TMBS, the chi-square difference tests between all models were significant for the early versus middle group, and the change in CFI was .01 for all of these tests. Given that items two, three, and seven were identified as displaying DIF and the DTF was .166, partial invariance testing was conducted on this measure. Items seven and eight were identified as causing variance at the $p < .05$ level for the metric

versus configural model. In addition, item two was identified as causing variance at the $p < .005$ level and items three and five were causing variance at the $p < .05$ level for the scalar versus metric models. Finally, item three was identified as causing variance at the $p < .001$ level and items four and eight were causing variance at the $p < .05$ level for the strict versus scalar models. Based on the combination of the CFA equivalence testing and previous DIF testing, items two, three, and seven were removed and the CFA equivalence testing was re-run. As a result, the chi-square difference tests for the metric versus configural, scalar versus metric, and strict versus scalar models were no longer significant and the change in CFI was less than .01. Hypothesis testing for the early versus middle age groups will proceed without items two, three and seven for the preference for organization subfactor of the TMBS. For the perceived control of time scale, the chi-square difference test of metric versus configural and scalar versus metric models were significant for the early versus middle group. However, the change in CFI did not exceed .01 for any of these tests. During the previous DIF testing, item three was identified as displaying DIF but the DTF was only .062. Given these results, hypothesis testing for the perceived control of time scale will include all items.

For the short-range planning subfactor of the TMQ, the chi-square difference tests between scalar and metric, and strict and scalar models were significant. However, the change in CFI did not exceed .01 for any of these tests. In addition, the DTF was only .065 in the previous testing using IRT methods. As a result, the short-range planning subfactor of the TMQ should be considered equivalent across early and middle age categories. For the time attitudes subfactor of the TMQ, the chi-square difference test for all models was not significant. In addition, previous testing did not reveal any indication

of differential functioning for the time attitudes scale. As a result, the time attitudes subfactor of the TMQ should be considered equivalent across early and middle age categories.

For the effective organization subfactor of the TSQ, all chi-square difference tests were nonsignificant except the structural versus strict model testing. In addition, previous DIF testing did not reveal any items of concern. As a result, the effective organization subfactor should be considered equivalent across the early and middle age categories. For the sense of purpose subfactor of the TSQ, the chi-square difference test between the strict and scalar models and the structural and strict models were significant. In addition, the change in CFI exceeded .01 for the strict and scalar model testing. By conducting partial equivalence testing, it was determined that item four was causing the variance at the $p < .001$ level. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test remained significant, but the change in CFI no longer exceeded .01 for the strict versus scalar models. Hypotheses testing will proceed without item four of the sense of purpose subfactor of the TSQ for the early versus middle age categories. For the structured routine subfactor of the TSQ, the chi-square difference tests between strict and scalar and structural and strict models was significant. In addition, the change in CFI exceeded .01 for the strict versus scalar test. By conducting partial equivalence testing, it was determined that items one and three were causing the variance at the $p < .005$ level. These items were removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01. Hypotheses testing will exclude items one and

three of the structured routine subfactor of the TSQ for the early versus middle age categories.

For the present orientation subfactor of the TSQ, the chi-square difference test between the strict versus scalar and structural versus strict models were significant. In addition, the change in CFI exceeded .01. Partial equivalence testing revealed that item three was causing the variance at the $p < .001$ level. This item was removed, and equivalence testing was conducted again. As a result, the model could not be identified and is not generally advised to have a measure with less than three items, so hypothesis testing for the early versus middle age categories with the present orientation subfactor will be discontinued. For the persistence subfactor of the TSQ, the chi-square difference tests of scalar versus metric, strict versus scalar, and structural versus strict models were significant. However, the change in CFI only exceeded .01 for the strict versus scalar test. Partial equivalence testing revealed that item one was causing the variance at the $p < .001$ level. This item was removed, and equivalence testing was conducted again. As a result, the model could not be identified and is not generally advised to have a measure with less than three items, so hypothesis testing for the early versus middle age categories with the persistence subfactor will be discontinued.

In summary of the measurement equivalence testing for early versus middle age groups, most of the measures included in this study were found to be equivalent. Exceptions include the preference for organization subfactor of the TMBS, and the sense of purpose, structured routine, present orientation, and persistence subfactors of the TSQ. For the preference for organization scale, items two, three, and seven will be removed before conducting hypothesis testing. The testing on the sense of purpose subfactor

revealed that the fourth item was not equivalent and should be removed for hypothesis testing. In addition, the first and third items of the structured routine subfactor were not equivalent. The present orientation and persistence subfactors were not found to be equivalent across the early and middle age groups and should not be used for hypothesis testing as removing items resulted in scales with less than three items and the resulting models could not be identified.

To determine if construct coverage was compromised with the removal of these items for the early versus middle age group, CFA was run on each subfactor with the items removed. All subfactors had the same or better model fit than the model fit previously conducted with all items. As a result, it appears there is adequate construct coverage to test Hypothesis 2. *Middle versus later.* Results of the middle versus later equivalence testing may be found in Table 11. For the middle versus later age categories, the chi-square difference tests were not significant for any of the tests of the goal setting and prioritizing subfactor of the TMBS. Therefore, this scale should be considered equivalent across the middle and later age categories. For the mechanics subfactor of the TMBS, the chi-square difference test was significant for the scalar versus metric models and the change in CFI exceeded .01. By conducting partial equivalence testing, it was determined that items one and three were causing variance at the $p < .001$ level and items two and ten were causing variance at the $p < .05$ level. Only items one and three were identified as displaying DIF in previous testing, so these items were removed and the test for equivalence was run again. As a result, the chi-square difference test and change in CFI were improved. Hypotheses testing will continue without items one and three of the mechanics subfactor of the TMBS for the middle and later age groups. For the preference

for organization subfactor of the TMBS, the chi-square difference tests between all models were significant for the middle versus later group. In addition, the change in CFI was .01 for all these tests. Previous testing identified items four and seven as displaying significant DIF and a DTF of .400 as well. By conducting partial equivalence testing, it was determined that items two and four were causing the variance at the $p < .05$ level for the metric versus configural test. In addition, item seven was identified at the $p < .05$ level as causing variance in the scalar versus strict test. Finally, item three was identified as causing variance at the $p < .05$ level and item seven was identified at the $p < .001$ level for the strict versus scalar test. Those items identified in previous DIF testing, four and seven, were removed first and the test for equivalence was run again. As a result, the chi-square difference test and change in CFI for metric versus configural and scalar versus metric models were improved. However, the chi-square difference test for the strict versus scalar models remained significant and the change in CFI continued to be .01. Partial equivalence testing determined that item eight was causing the variance at the $p < .001$ level. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test and change in CFI for the strict versus scalar models was improved as well and indicated the measure was equivalent. Hypothesis testing will proceed for the preference for organization subfactor of the TMBS without items four, seven, and eight for the middle and later age categories. The perceived control of time scale was found to be equivalent at each level of testing across the middle versus later age groups.

For the short-range planning subfactor of the TMQ, the chi-square difference test between scalar and metric models was significant. However, the change in CFI did not

exceed .01 for this test. In addition, previous testing did not indicate any items displayed DIF. As a result, the short-range planning subfactor of the TMQ should be considered equivalent across middle and later age categories. For the time attitudes subfactor of the TMQ, the chi-square difference tests of scalar versus metric, strict versus scalar, and structural versus strict models were significant. In addition, the change in CFI exceeded .01 for the strict versus scalar test. By conducting partial equivalence testing, it was determined that item one was causing the variance at the $p < .005$ level. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01 for the strict versus scalar models. Hypothesis testing will be conducted without item one of the time attitudes subfactor of the TMQ for the middle and later age groups.

For the effective organization subfactor of the TSQ, the chi-square difference tests between metric and configural models was significant. However, the change in CFI did not exceed .01. In addition, there were no items previously identified as displaying DIF. As a result, the effective organization subfactor should be considered equivalent across the middle and later age categories. Previous testing revealed item three was displaying significant DIF, but the DTF was only .021. For the sense of purpose subfactor of the TSQ, the chi-square difference tests between the strict and scalar and structural and strict models were significant. However, the change in CFI did not exceed .01. As a result, the sense of purpose subfactor should be considered equivalent across middle and later age categories. The structured routine subfactor of the TSQ was found to be equivalent across the middle and later age categories. For the present orientation subfactor of the TSQ, the chi-square difference test between the strict and scalar models was significant. In

addition, the change in CFI exceeded .01. Partial equivalence testing revealed that item three was causing the variance at the $p < .001$ level. This item was removed, and equivalence testing was conducted again. As a result, the model could not be identified and is not generally advised to have a measure with less than three items, so hypothesis testing for the early versus middle age categories with the present orientation subfactor will be discontinued. For the persistence subfactor of the TSQ, all of the chi-square difference tests were significant. However, the change in CFI did not exceed .01 for any of the tests. As a result, the persistence subfactor of the TSQ will be considered equivalent across middle and later age groups.

To summarize, the middle versus later measurement equivalence testing revealed some scales that require modification due to items that were not equivalent. First, testing on the mechanics subfactor of the TMBS revealed that items one and three are not equivalent and should be removed before hypothesis testing. In addition, items four, seven, and eight were not equivalent for the preference for organization subfactor of the TMBS. Next, item one of the time attitudes subfactor of the TMQ was not equivalent and should be removed for hypothesis testing. For the TSQ, the third item of the present orientation scale was not equivalent and the model could not be identified with the remaining two items, so the present orientation scale will not be used in hypothesis testing.

To determine if construct coverage was compromised for the middle versus later age groups with the removal of these items, CFA was run on each subfactor with the items removed. With the exception of the time attitudes subfactor of the TMQ, all subfactors had the same or better model fit than the model fit previously conducted with

all items. As a result, it appears there is adequate construct coverage to test Hypothesis 2. Any testing of middle versus later age groups using the time attitudes subfactor of the TMQ should be interpreted with caution.*Early versus later.* Results for the equivalence testing of the early versus later age groups may be found in Table 12. For the early versus later age categories, the chi-square difference tests were significant for the scalar versus metric and strict versus scalar models of the goal setting and prioritizing subfactor of the TMBS. However, the change in CFI did not exceed .01. As a result, the goal setting and prioritizing subfactor of the TMBS should be considered equivalent for early versus later age categories. For the mechanics subfactor of the TMBS, the chi-square difference test was significant for the metric versus configural and scalar versus metric models. In addition, the change in CFI exceeded .01 for the scalar versus metric models. Previous testing indicated items three, seven, and ten displayed significant DIF as well. By conducting partial equivalence testing, it was determined that item three was causing variance at the $p < .001$ level, items one, six, and ten were causing variance at the $p < .005$ level, and item two was causing variance at the $p < .05$ level. These items, in addition to item seven noted in the DIF testing, were removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI was no longer greater than 01. Hypotheses testing with the mechanics subfactor of the TMBS for the early versus later age group will proceed without items one, two, three, six, seven, and ten as a result.

For the preference for organization subfactor of the TMBS, the chi-square difference tests between all models were significant for the early versus later group, and the change in CFI exceeded .01 for all of these tests. Previous testing indicated that items

two, four, and seven were displaying significant DIF. By conducting partial equivalence testing for the metric test, it was determined that items two, seven, and eight were causing the variance at the $p < .05$ level. In addition, item four was causing variance at the $p < .001$ level. Partial equivalence testing for the scalar test revealed that item four was causing the variance at the $p < .05$ level. In addition, items two and seven were causing variance at the $p < .001$ level. Finally, by conducting partial equivalence testing for the strict test, it was determined that item six was causing the variance at the $p < .05$ level. In addition, items three and eight were causing variance at the $p < .001$ level. First, the items identified by the DIF testing were removed and the test for equivalence was run again. As a result, the chi-square difference test for the strict versus scalar models remained significant and the change in CFI continued to exceed .01. Next, items three, six, and eight were removed and the test for equivalence was run again. However, the model could not be identified with the remaining two items. As a result, hypotheses testing for the preference for organization subfactor of the TMBS will be discontinued for the early versus later age groups. For the perceived control of time scale, the chi-square difference test between metric and configural and structural and strict models were significant for the early versus later group. In addition, the change in CFI exceeded .01. Previous testing indicated item three displayed significant DIF. By conducting partial equivalence testing, it was determined that item three was causing the variance at the $p < .001$ level for this testing as well. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test and change in CFI for the metric versus configural models was improved. Hypothesis testing will be adjusted to exclude item three of the perceived control of time scale for the early versus later age categories.

For the short-range planning subfactor of the TMQ, the chi-square difference test between scalar and metric models was significant. In addition, the change in CFI exceeded .01 for this test. Previous testing indicated that items two, four, five, six, and seven were identified as displaying significant DIF which would reduce this measure to two items. By conducting partial equivalence testing, it was determined that items two, four, six, and seven were causing the variance at the $p < .001$ level. These items were removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01. Hypothesis testing will be adjusted to exclude items two, four, six, and seven from the short-range planning subfactor of the TMQ for the early versus later age categories. For the time attitudes subfactor of the TMQ, the chi-square difference tests of metric versus configural, scalar versus metric, and structural versus strict models were significant. In addition, the change in CFI exceeded .01 for these tests. Previous testing indicated that item one displayed significant DIF. By conducting partial equivalence testing for the metric versus scalar models, it was determined that item one was causing the variance at the $p < .005$ level. In addition, partial equivalence testing on the scalar versus metric models indicated that item three was causing the variance at the $p < .001$ level. Items one and three were removed and the test for equivalence was run again. As a result, the chi-square difference tests remained significant for the strict versus scalar test and the change in CFI exceeded .01. Further partial equivalence testing revealed that item four caused the variance. Item four was removed and equivalence testing was conducted again. As a result, the model was unable to be identified. As it is not advised to have a measure with less than three items and the model could not be identified with the remaining equivalent

items, hypothesis testing will not include the time attitude subfactor of the TMQ for the early versus later age categories.

For the effective organization subfactor of the TSQ, the chi-square difference tests of scalar versus metric, strict versus scalar, and structural versus strict models were significant. However, the change in CFI only exceeded .01 for the structural versus strict test. Previous testing did not identify any items displaying significant DIF and the DTF was only .005, which is very small. As a result, the effective organization subfactor will proceed with hypothesis testing across the middle and later age categories. For the sense of purpose subfactor of the TSQ, the chi-square difference tests of the scalar versus metric, strict versus scalar, and structural versus strict models were significant. However, the change in CFI only exceeded .01 for the strict versus scalar and structural versus strict tests. Previous testing identified item four as displaying significant DIF, however, the DTF was only .023. Partial equivalence testing was conducted to investigate further and it was determined that items two, three, and four were causing the variance at the $p < .001$ level and item one was causing variance at the $p < .05$ level. Item four was removed due to it being identified in the DIF testing, and equivalence testing was repeated. The chi-square difference tests for strict versus scalar and structural versus strict remained significant and the change in CFI continued to exceed .01. If all items identified in the partial equivalence testing were removed, the measure would be left with one item, so hypothesis testing for the early versus later age categories with the sense of purpose subfactor will be discontinued.

For the structured routine subfactor of the TSQ, the chi-square difference tests for the strict versus scalar and structural versus strict models were significant. In addition,

the change in CFI exceeded .01 for the strict versus scalar. Previous testing did not reveal any items displaying DIF. By conducting partial equivalence testing, it was determined that item one was causing the variance at the $p < .001$ level. Item one was removed, and equivalence testing was repeated. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01. Hypothesis testing with the structured routine subfactor of the TSQ for the early versus later age categories will proceed without item one. The present orientation subfactor of the TSQ was found to be equivalent by all tests. For the persistence subfactor of the TSQ, all of the chi-square difference tests were significant. In addition, the change in CFI exceeded .01 for all the tests. By conducting partial equivalence testing, it was determined that all of the items were causing the variance. As a result, hypothesis testing for the early versus later age categories with the persistence subfactor will be discontinued.

To summarize the early versus later measurement equivalence testing, there were many items and measures that were not equivalent and require adjustment before hypothesis testing. First, testing on the mechanics subfactor of the TMBS revealed that six items were not equivalent for the early and later age groups. As a result, hypothesis testing with the mechanics scale will only include items four, five, eight, nine, and eleven. Next, the testing on the preference for organization subfactor of the TMBS revealed that it was not equivalent for the early versus later age categories. In addition, testing on the perceived control of time scale found that item three was not equivalent across early and later age groups and should be removed prior to hypothesis testing. Next, testing of the short-range planning subfactor of the TMQ revealed that items two, four, six, and seven were not equivalent across the early and later age groups. Meanwhile, the

time attitudes subfactor of the TMQ was not equivalent and should not be included in further testing for the early and later age groups. For the testing of the structured routine subfactor of the TSQ, the first item was identified as not being equivalent. Finally, the sense of purpose and persistence subfactors of the TSQ contained items that were not equivalent and should not be tested further because it would result in measures with less than three items for which the models could not be identified.

To determine if construct coverage was compromised with the removal of these items for the early versus later age groups, CFA was run on each subfactor with the items removed. With the exception of the structured routine subfactor of the TSQ, all subfactors had the same or better model fit than the model fit previously conducted with all items. As a result, it appears there is adequate construct coverage to test Hypothesis 2. However, any testing using the structured routine subfactor of the TSQ should be interpreted with caution.

***Temporal Awareness.*** All individuals responded to the items necessary to determine the temporal awareness level and the full data set is used for the measurement equivalence testing concerning temporal awareness. Testing is conducted across low (n = 280) and high (n = 967) levels of temporal awareness as described in the methods section. All results are displayed in Table 13. For the goal setting and prioritizing subfactor of the TMBS, the chi-square difference test between scalar and metric models was significant. The change in CFI between these models did not exceed .01. In addition, previous testing identified item three as displaying significant DIF; however, the DTF was only .023, which is small. As a result, the goal setting and prioritizing subfactor of the TMBS should be considered equivalent across levels of temporal awareness.

The mechanics subfactor of the TMBS was found to be equivalent at each level of testing across temporal awareness. For the preference for organization subfactor of the TMBS, the chi-square difference tests for all models were significant. However, the change in CFI did not exceed .01 for any of the tests. Previous testing indicated item seven displayed significant DIF and the DTF was .101, which is large. As a result, further investigation of the preference for organization subfactor of the TMBS was conducted through partial equivalence testing. Only item eight was identified as causing variance for the strict versus scalar model testing at the $p < .001$ level. Items seven and eight were removed and the equivalence test was run again. As a result, the chi-square difference test was no longer significant and the change in CFI was less than .01. The preference for organization subfactor of the TMBS will proceed with hypothesis testing regarding temporal awareness without items seven and eight. The perceived control of time scale was found to be equivalent at each level of testing across temporal awareness.

For the short-range planning subfactor of the TMQ, the chi-square difference test between scalar and metric models was significant. However, the change in CFI did not exceed .01 for this test. Previous testing indicated item four displayed significant DIF; however, the DTF was only .068 which is smaller than the .096 cutoff. As a result, the short-range planning subfactor of the TMQ should be considered equivalent across temporal awareness. For the time attitudes subfactor of the TMQ, the chi-square difference tests between scalar and metric models was significant; however, the change in CFI did not exceed .01 for this test. In addition, previous testing did not indicate any items displaying DIF. As a result, the time attitudes subfactor of the TMQ should be considered equivalent across levels of temporal awareness.

For the effective organization subfactor of the TSQ, the chi-square difference tests between metric and configural, and scalar and metric models were significant. However, the change in CFI did not exceed .01 for either of the tests. Previous testing indicated items three and four displayed significant DIF and there was a DTF of .109. As a result, further investigation was merited. By conducting partial equivalence testing for the metric versus configural models, it was determined that item three was causing the variance at the $p < .001$ level. Partial equivalence testing for the scalar versus metric models identified items three and four causing variances at the $p < .05$ level. Removal of both items resulted in a model that could not be identified. As a result, the effective organization subfactor will not be used in hypothesis testing concerning temporal awareness. The sense of purpose subfactor of the TSQ was found to be equivalent across temporal awareness. For the structured routine subfactor of the TSQ, the chi-square difference tests between the strict and scalar models was significant. In addition, the change in CFI exceeded .01. By conducting partial equivalence testing, it was determined that item one was causing the variance at the $p < .001$ level. This item was removed and the test for equivalence was run again. As a result, the chi-square difference test was no longer significant and the change in CFI no longer exceeded .01 for the strict versus scalar models. Hypothesis testing will proceed for the structured routine subfactor of the TSQ without item one for levels of temporal awareness. For the present orientation subfactor of the TSQ, the chi-square difference test between the strict versus scalar models was significant. In addition, the change in CFI exceeded .01. By conducting partial equivalence testing, it was determined that items two and three were causing the variance. As a result, this measure would be left with only one item, so hypothesis testing

for temporal awareness with the present orientation subfactor will be discontinued. For the persistence subfactor of the TSQ, all of the chi-square difference tests were significant except the scalar versus metric test. However, the change in CFI only exceeded .01 for the strict versus scalar test. By conducting partial equivalence testing, it was determined that all of the items were causing the variance, so hypothesis testing for temporal awareness with the persistence subfactor will be discontinued.

To summarize the measurement equivalence testing across levels of temporal awareness, most of the scales were found to be equivalent. Exceptions include the preference for organization subfactor of the TMBS, and the effective organization, structured routine, present orientation, and persistence subfactors of the TSQ. For the preference for organization scale, hypothesis testing should proceed without items seven and eight, which were not equivalent. In addition, hypothesis testing should proceed without the first item of the structured routine scale as it was not equivalent. Meanwhile, the effective organization, present orientation, and persistence scales should not be used in hypothesis testing given they were not able to display equivalence.

To determine if construct coverage was compromised with the removal of these items for the temporal awareness groups, CFA was run on each subfactor with the items removed. With the exception of the structured routine subfactor of the TSQ, all subfactors had the same or better model fit than the model fit previously conducted with all items. As a result, it appears there is adequate construct coverage to test Hypothesis 2. However, any testing using the structured routine subfactor of the TSQ should be interpreted with caution.

**Hypothesis 1**

Hypothesis 1 states that females will engage in significantly more time management behaviors than males while also reporting significantly less perceived control of time. To test this hypothesis, an independent samples t-test was conducted to determine if the means of females were significantly different from males on the time management subfactors of the TMBS and the perceived control of time scale of the TMBS. In addition, hypothesis testing was conducted on the TMQ for Hypothesis 1 because the short-range planning subfactor is indicative of time management behaviors while the time attitudes subfactor is similar in nature to the perceived control of time scale. The TSQ was not tested for Hypothesis 1 as it does not have any subfactors that capture a perceived control of time or attitude about time. For each of the scales, the Levene's test for equality of variances was evaluated to determine if the variances should be assumed equal. Only violations of this test will be noted below. Results of the independent samples t-test for Hypothesis 1 are reported in Table 14.

For the goal setting and prioritizing subfactor of the TMBS, the scale was altered to exclude item eight as detailed in measurement equivalence testing previously. No significant difference was noted between males (M=3.66, SD=.67) and females (M=3.70, SD=.65), t(1,239) = -1.11, $p > .05$; 95% CI [-.12, .03], d = -.06. For the mechanics subfactor of the TMBS, the scale was altered to exclude items three, four, five, seven, eight, nine, and ten as detailed previously in measurement equivalence testing. A significant difference was noted between males (M=2.95, SD=.89) and females (M=3.22, SD=.89), t(1,239) = -5.33, $p < .001$; 95% CI [-.37, -.17], d = -.30 (small effect size). For the preference for organization subfactor of the TMBS, a significant difference was noted

between males (M=3.71, SD=.74) and females (M=3.90, SD=.76), t(1,239) = -5.33, $p < .001$; 95% CI [-.27, -.10], d = -.25 (small effect size). For the perceived control of time scale, no significant difference was noted between males (M=3.44, SD=.75) and females (M=3.43, SD=.82), t(1,239) = .34, $p > .05$; 95% CI [-.07, .10], d = -.11. In order for Hypothesis 1 to be fully supported, females would need to have significantly higher scores on at least some aspects of the TMBS while also reporting significantly less perceived control of time. While females did report significantly more use of time management in the form of mechanics and preference for organization, they did not have a significant difference in their perceived control of time. As a result, Hypothesis 1 is not fully supported.

For the short-range planning subfactor of the TMQ, the scale was altered to exclude items four and five as detailed previously in the measurement equivalence testing. A significant difference was noted between males (M=2.92, SD=.98) and females (M=3.18, SD=.96), t(1,239) = -4.87, $p < .001$; 95% CI [-.38, -.16], d = -.27 (small effect). For the time attitudes subfactor of the TMQ, the scale was altered to exclude item four as detailed previously in the measurement equivalence testing. A significant difference was noted between males (M=3.11, SD=.59) and females (M=3.03, SD=.62), t(1,239) = 2.48, $p < .05$; 95% CI [.02, .15], d = .13 (very small effect). Hypothesis 1 is supported for the TMQ scale as females engaged in significantly more time management behaviors than males while also reporting significantly fewer positive results on the time attitudes scale. However, as previously noted, the interpretation of results with the time attitudes subfactor of the TMQ should be interpreted with caution given the poor model fit after item removal indicating there may be a lack of construct coverage.

**Hypothesis 2**

Hypothesis 2 states that older adults will score higher on time management behaviors than those in younger categories. Groups were divided into three categories: early adulthood (18-35); middle adulthood (36-50); and later adulthood (over 50). Using these new variables, a one-way analysis of covariance (ANCOVA) with planned contrasts was run to determine if the means of those in later adulthood was significantly higher than those in early (2a) and middle (2b) adulthood; as well as, whether means of those in middle adulthood are significantly higher than early adulthood (2c). Given there are many factors that may influence the use of time management behaviors as a working adult, certain factors were used as covariates (conscientiousness, job complexity, tenure at job, career stage, and memory). Testing for Hypothesis 2 was run using the time management behaviors subfactors of the TMBS that were determined to be equivalent across age groups (goal setting and prioritization and mechanics), the short-range planning subfactor of the TMQ, and all subfactors of the TSQ found to be equivalent (effective organization and structured routine). Per the measurement equivalence testing, the mechanics subfactor of the TMBS was adjusted to exclude items one, two, three, six, seven, and ten. The short-range planning subfactor of the TMQ was adjusted to exclude items two, four, six, and seven per the measurement equivalence testing above. The structured routine subfactor of the TSQ was adjusted to exclude items one and three per the measurement equivalence testing above.

For the goal setting and prioritization subfactor of the TMBS, there was a significant mean difference [$F(2, 1{,}233) = 5.54$, $p < .005$, $\eta^2_{partial} = 0.009$] in age categories. Results of the analysis may be found in Table 15. Conscientiousness and job

complexity had a significant relationship with the goal setting and prioritizing factor. Planned contrasts were assessed using the Bonferroni correction of $p < .017$ and results may be found in Table 16. There was no significant difference found when comparing the later age group to the early age group ($p = .054$) or the middle age group ($p = .512$). As a result, Hypothesis 2a and 2b are not supported for this time management behavior. A significant difference was found between the early and middle age groups ($p = .001$) where the estimated marginal means show the early age group engages in more goal setting and prioritizing (M = 3.66, SE = .03) than the middle age group (M = 3.53, SE = .03). Given this is the opposite of the relationship hypothesized, Hypothesis 2c is not supported for this particular time management behavior.

For the mechanics subfactor of the TMBS, there was not a significant mean difference [$F(2, 1{,}233) = 2.24$, $p > .05$, $\eta^2_{partial} = 0.004$] in age categories. Memory, conscientiousness, job complexity and the maintenance career stage all had a significant relationship with mechanics. Results may be found in Table 17. As a result, Hypothesis 2 was not supported for this time management behavior.

For the short-range planning subfactor of the TMQ, there was a significant mean difference [$F(2, 1{,}233) = 3.53$, $p < .05$, $\eta^2_{partial} = 0.006$] in age categories (results in Table 18). Memory, conscientiousness, and job complexity had a significant relationship with the short-range planning factor. The significance of the planned contrasts was assessed using the Bonferroni correction of $p < .017$ and results are reported in Table 19. There was no significant difference found when comparing the later age group to the early age group ($p = .075$) or the middle age group ($p = .833$). As a result, Hypothesis 2a and 2b are not supported for this time management behavior. A significant difference was found

between the early and middle age groups ($p$ = .010) where the estimated marginal means show the early age group engages in more short-range planning (M = 3.16, SE = .04) than the middle age group (M = 3.00, SE = .04). Given this is the opposite of the relationship hypothesized, Hypothesis 2c is not supported for this particular time management behavior.

For the effective organization subfactor of the TSQ, there was no significant mean difference [$F$(2, 1,233) = .27, $p$ = .762, $\eta^2_{partial}$ = 0.000] in age categories. Memory, conscientiousness, job complexity, and the exploration career stage all had a significant relationship with the effective organization factor. Results may be found in Table 20. Given the lack of significant mean differences, Hypothesis 2 is not supported for this time management behavior.

For the structured routine subfactor of the TSQ, there was no significant mean difference [$F$(2, 1,233) = .70, $p$ = .497, $\eta^2_{partial}$ = 0.001] in age categories. Memory, conscientiousness, job complexity, and the maintenance career stage all had a significant relationship with the structured routine factor. Results may be found in Table 21. Given the lack of significant mean differences, Hypothesis 2 is not supported for this time management behavior.

Overall, Hypothesis 2 was not supported due to lack of significant mean differences between the older age groups and the younger age groups. Contrary to the hypothesized relationships, the early age category reported significantly more goal setting and prioritization and short-range planning behaviors than the middle age category.

**Research Question 3**

Research Question 3 asks if individuals who are higher in temporal awareness will have significantly different responses to the time management measures than those who are lower in temporal awareness. An independent sample t-test was conducted to determine if the means of those high in temporal awareness were significantly different than those low in temporal awareness. These tests were run on each of the subfactors of the TMBS, TMQ, and TSQ. For the TSQ, the effective organization, present orientation and persistence subfactors were not tested as outlined in the measurement equivalence testing above. The Levene's test for equality of variances was tested for each scale before moving forward with mean testing. Violations of Levene's test are noted. Results of the independent samples t-test are reported in Table 22.

For the goal setting and prioritizing subfactor of the TMBS, no significant difference was noted between low (M=3.54, SD=.68) and high temporal awareness (M=3.60, SD=.67), t(1,245) = -1.20, $p > .05$; 95% CI [-.14, .03], d = -.09. For the mechanics subfactor of the TMBS, no significant difference was noted between low (M=3.01, SD=.80) and high temporal awareness (M=2.98, SD=.78), t(1,245) = .64, $p > .05$; 95% CI [-.07, .14], d = .04. For the preference for organization subfactor of the TMBS, items seven and eight were removed based on the measurement equivalence testing above. The Levene's test for equality of variances was less than .005 indicating the variances are not assumed equal. A significant difference was noted between low (M=4.01, SD=.74) and high temporal awareness (M=3.79, SD=.82), t(497.96) = 4.38, $p < .001$; 95% CI [.12, .33], d = .27 (small effect size). For the perceived control of time scale, no significant difference was noted between low (M=3.47, SD=.78) and high

temporal awareness (M=3.42, SD=.79), t(1,245) = .91, $p > .05$; 95% CI [-.06, .15], d = .06. For the TMBS scale, only the preference for organization subfactor had a significant difference between low and high temporal awareness. Interestingly, the low temporal awareness individuals indicated more of a preference for organization than the high temporal awareness individuals.

For the short-range planning subfactor of the TMQ, no significant difference was noted between low (M=3.19, SD=.80) and high temporal awareness (M=3.13, SD=.81), t(1,245) = .57, $p > .05$; 95% CI [-.05, .17], d = .07 (very small effect). For the time attitudes subfactor of the TMQ, no significant difference was noted between low (M=3.19, SD=.56) and high temporal awareness (M=3.15, SD=.58), t(1,245) = 1.06, $p > .05$; 95% CI [-.04, .12], d = .07. For the TMQ, there are no significant differences between low and high temporal awareness.

For the sense of purpose subfactor of the TSQ, no significant difference was noted between low (M=3.97, SD=1.08) and high temporal awareness (M=4.09, SD=1.08), t(1,245) = -1.56, $p > .05$; 95% CI [-.26, .03], d = -.11.For the structured routine subfactor of the TSQ, the scale was altered to exclude item one as detailed previously in the measurement equivalence testing. No significant difference was noted between low (M=3.00, SD=.90) and high temporal awareness (M=3.00, SD=.87), t(1,245) = .06, $p > .05$; 95% CI [-.11, .12], d = .00. For the TSQ, there are no significant differences between low and high temporal awareness.

Overall, the only significant difference noted between the low and high levels of temporal awareness were on the preference for organization subfactor of the TMBS.

Contrary to expectations, those with low temporal awareness reported higher scores on the preference for organization scale.

**Ideal Point Response Method**

The Generalized Graded Unfolding Model (GGUM; Roberts et al., 2000) was used to examine the time management measures from an ideal point response methodology. The GGUM was used due to its ability to handle polytomous responses such as the Likert-type responses in the current study. The mirt package (Chalmers, 2012) in R was used to compute the fit statistics for the GGUM. The fit statistics from the GGUM and GRM can be found in Table 2. With the exception of a few items displaying a marginally better fit with GGUM, the fit statistics were significantly worse with the GGUM model than the GRM model. When assessing the item parameters for the GGUM (Table 23), it appears the GGUM model was unable to converge properly given the delta parameters, on Table 23, are very close to zero. Delta parameters should have a better spread if the model has converged adequately, whereas all item location parameters clustering close to zero indicates a stalled estimation, which is most likely caused by using an inappropriate model (Wang, de la Torre, & Drasgrow, 2014; Roberts, Donoghue, & Laughlin, 2002; Thissen & Steinberg, 1986). As a result, it is apparent that there was not an improvement in model fit with the ideal point response methodology. Research question 4 asked if the time management measures would display a better model fit with an ideal point response process than a dominant response process. The current study sought the answer to this question by comparing results from GGUM and GRM models using IRT methods. The GGUM had poor fit and poor model behavior indicating that ideal point model is not the appropriate model for these items. Based on

these findings, it appears that the dominant response process is a better fit for the time management measures.

**Ad Hoc Analysis**

One aim of the current study was to compare the TMBS, TMQ, and TSQ to determine if they would generate comparable results. Notably, the TMBS seemed to perform the best in regard to modeling the data with IRT methods. The perceived control of time scale, which is often used in conjunction with the TMBS, the majority of the items on the TMQ, and all items of the TSQ did not meet standards of adequately fitting the graded respond model (GRM). In addition, as noted previously, the long-range planning subfactor of the TMQ had such a low Cronbach's alpha that it was unable to be tested. Further, the TSQ displayed some confusing correlational results deeming the measure questionable. Based on these results, it may indicate that the TMBS is the best measure to use when testing time management behaviors. However, as mentioned in the beginning, the TMBS has had varying results in previous research as well. Some previous research has used certain subfactors from both the TMBS and the TMQ to test their hypotheses (Claessens et al., 2004), and it would seem prudent to consider a combination of the three measures in this study to form a universal measure.

The definition provided by Claessens et al. (2007) at the beginning detailed categories of behaviors that could be assessed by a combination of the time management measures in this study. The first behaviors outlined are the assessment of time behaviors or self-awareness of time use (Claussens et al., 2007). An assessment of this first category may be achieved by combining the items that displayed equivalency and best model fit in the mechanics and preference for organization subfactors of the TMBS, and

the effective organization subfactor of the TSQ. The second category of behaviors outlined are planning behaviors (i.e., setting goals, planning tasks; Claessens et al., 2007). A combination of viable items from the goal setting and prioritizing subfactor of the TMBS and short-range planning subfactor of the TMQ could be used to assess this category. The final category of behaviors outlined are monitoring behaviors (i.e., observation of one's use of time; Claeseens et al., 2007). The remaining items of the TSQ appear to fall into the category of monitoring time use so viable items should be considered for assessing this last set of behaviors. As an additional analysis, the current study explores the possibility of combining items from these three measures to form a universal measure of time management. Eliminating redundant items across measures and those items that did not perform well overall should help reduce the number of items to a manageable level. In addition, the perceived control of time scale and the time attitudes subfactor of the TMQ will be combined to create a measure to assess a general sense of control over time. The perceived control of time scale has been considered an outcome measure of time management in the past (Claessens et al., 2007) and could be strengthened by the addition of the time attitudes items. To remain consistent with the previous analyses, subfactors will be assessed for best model fit using CFA and IRT. In addition, future research may benefit from the ability to test certain aspects of time management (i.e., assessment of time behaviors) and wish to understand the model fit of each of those aspects individually.

To begin this additional analysis, a subfactor called assessment of time behaviors was created using item 11 from the mechanics subfactor of the TMBS, items one, five, and six from the preference for organization subfactor of the TMBS, and items one, 12,

and 13 from the effective organization subfactor of the TSQ. This subfactor did not fit the data well ($\chi^2$ (14) = 281.38, $p$ < .001, RMSEA = .124 [90% CI = .111, .137], CFI = .83, SRMR = .07). Results are reported in Table 24. Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items five (*When I make a things-to-list at the beginning of the day, it is forgotten or set aside by the end of the day*) and six (*My days are too unpredictable to plan and manage my time to any great extent*) from the preference for organization subfactor and items three (*Do you take a long time to get going?*) and four (*Do you tend to change rather aimlessly from one activity to another during the day?*) from the effective organization subfactor to correlate created a significantly improved model. Analysis of the item content of these items revealed they are primarily dealing with following an organizational plan or schedule while other items within this scale deal with creating an organized and uninterrupted space. As a result, the modification was retained. Results of the revised model may be found in Table 24. IRT analyses were also conducted on the proposed assessment of time management behaviors subfactor and all items displayed adequate fit except those from the TSQ. Results are shown on Table 26.

Another subfactor called planning behaviors was created using all items of the goal setting and prioritizing subfactor of the TMBS excluding item eight, and items one and three from the short-range planning subfactor of the TMQ. This subfactor did not fit the data well ($\chi^2$ (44) = 1186.69, $p$ < .001, RMSEA = .144 [90% CI = .137, .151], CFI = .75, SRMR = .08). Results are reported in Table 24. Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items one and three from the short-range planning subfactor to correlate

created a significantly improved model. Given these are the only two items from the TMQ while all others were from the TMBS, it seems reasonable they would resemble each other more than the remaining items in this new subfactor. As a result, the modification was retained. Results of the revised model may be found in Table 24. IRT analyses of the planning behaviors subfactor revealed adequate fit for all items (see Table 26).

The next subfactor created, called monitoring behaviors, contains items two, six, ten, 17, 21, and 22 from the TSQ, in addition to items four and five from the structured routine subfactor of the TSQ. This subfactor did not fit the data well ($\chi^2$ (20) = 259.17, $p$ < .001, RMSEA = .098 [90% CI = .087, .109], CFI = .85, SRMR = .06). Results are reported in Table 24. Modification indices were examined to determine if any were practical and theoretically justifiable. Allowing the error terms of items two (*Do you ever find that time just seems to slip away?*) and six (*And what about the past? Do you find yourself dwelling on the past?*) from the TSQ to correlate created a significantly improved model. Analysis of the item content of these items revealed they are primarily dealing with losing time or dwelling on the past while other items within this scale deal with monitoring the use of time more specifically. As a result, the modification was retained. Results of the revised model may be found in Table 24. IRT analyses of the monitoring subfactor revealed all items have adequate fit excluding item 17 and 20 of the TSQ. Results are found in Table 26.

Many of the items in the new monitoring subfactor were not tested for measurement equivalence across the groups of interest because they did not fall into a subfactor on the TSQ. As a result, measurement equivalence testing was conducted on

the monitoring subfactor. The same datasets and methods were utilized as previously described in the measurement equivalence portion of the results section above. Results are reported in Table 25. For gender, the chi-square difference test between scalar and metric models was significant; however, the change in CFI did not exceed .01. For the early versus middle age groups, the chi-square difference test between structural and strict models was significant; however, the change in CFI did not exceed .01. For the middle versus later age groups, the chi-square difference tests for the scalar versus metric and strict versus scalar models were significant. In addition, the change in CFI exceeded .01 for both tests. By conducting partial equivalence testing, it was determined that items two and 22 were causing the variance at the $p < .001$ level. Items two and 22 were removed, and equivalence testing was repeated. As a result, the chi-square difference tests were no longer significant. For the early versus middle age groups, the chi-square difference tests for the scalar versus metric, strict versus scalar, and structural versus strict models were significant. In addition, the change in CFI exceeded .01 for the scalar versus metric and strict versus scalar tests. By conducting partial equivalence testing, it was determined that items two and 22 were causing the variance at the $p < .005$ level and item six was causing the variance at the $p < .05$ level for the scalar versus metric test. Meanwhile, item two was identified as causing variance at the $p < .001$ level for the strict versus scalar test. Items two and 22 were removed, and equivalence testing was repeated. As a result, the chi-square difference tests were no longer significant. Lastly, the temporal model did not converge, and measurement equivalence could not be determined.

Finally, a scale called sense of control over time was created using all items of the perceived control of time scale, excluding item three, and items two, three, and five of the time attitudes subfactor of the TMQ. This subfactor fit the data well ($\chi^2$ (14) = 102.66, $p$ < .001, RMSEA = .071 [90% CI = .059, .085], CFI = .94, SRMR = .04). Results are reported in Table 24. IRT analyses of the sense of control scale revealed all items displayed adequate fit, excluding items four and five of the perceived control of time scale. A list of the items and their content for the proposed scale may be found in Table 28.

## DISCUSSION

The topic of time management becomes increasingly more important as more individuals try to manage demands on their time from work, family, and other societal obligations. Many people struggle to find ways to balance these demands and seek out methods to manage their time wisely (Claessens, Roe, & Rutte, 2009). Research has struggled to keep up with the suggested techniques for time management. That is, there are many practical suggestions for effective management of time, but little research to support their effectiveness (Claessens, Roe, & Rutte, 2009). There are many factors that may influence the effectiveness of any given method of time management and research needs to begin to address some of those. The current study hoped to begin to address some of these factors in order to move research forward. One basic area that requires further investigation is research on group differences in time management (Claessens et al., 2009). As previously discussed, some limited evidence exists that there are group differences in gender and age (Macan et al., 1990; Misra & McKean, 2000; Macan, 1994; Mudrack, 1997) and the current study sought to understand those differences further.

However, before exploring these group differences, it was necessary to establish whether our current measures of time management were equivalent across those groups.

The current study used a combination of item response theory (IRT) differential functioning analysis and confirmatory factor analysis (CFA) to create a clear picture of how items and scales functioned across the groups of interest. This combination of methods has been cited as a preferred method for investigating the equivalence of measures (Meade & Lautenschalager, 2004), but not all studies have the capability of doing so because of the large sample sizes needed for IRT. Given this study required a large sample to perform other analyses, this combination of methods was used to assess equivalence and provide a richer view of how the items function across groups of interest. As noted in the introduction, assessing measurement equivalence is more than just a required step preceding substantive testing of mean differences. Vandenberg and Lance (2000) stress the importance of measurement equivalence testing to make meaningful inferences concerning the interpretation of measures by various groups.

While previous research has not tested hypotheses across groups specifically, which would require the testing of measurement equivalence, the results of previous studies may still be suspect as they could be picking up on statistical artifacts. For instance, in the current study, several items were noted on the mechanics subfactor of the TMBS as lacking measurement equivalence across gender. As noted previously, the mechanics subfactor was one of the scales identified as having variability between genders in previous studies through correlational differences. Many of the items identified in this study as lacking measurement equivalence dealt with keeping notes, appointments, and bringing work with them when they know they will have to wait.

Much of the theoretical basis for Hypothesis 1 highlighted the idea that women may need to engage in more of these types of time management behaviors in order to manage their various roles and responsibilities. As such, the lack of equivalence in these items may be indicative of an overall difference in how different genders interpret the construct of time management. This finding may be indicative of a larger problem in how time management is defined. Alternatively, the wording of the items may simply need to be revised to more accurately capture the underlying construct across genders.

Once the items were fully assessed for equivalence, the current study began testing various hypotheses and research questions concerning individual differences (i.e., gender, age, temporal awareness). Items that were found to lack equivalence were removed before testing hypotheses and research questions. Additional confirmatory factor analysis was conducted on the reduced subfactors to ensure construct coverage. The time attitudes subfactor of the TMQ had a slightly unacceptable model fit as a result of the removal of items concerning gender. As a result, the testing for Hypothesis 1 with this subfactor should be viewed with some caution. Hypothesis 1 states that females will engage in significantly more time management behaviors than males while also reporting significantly less perceived control of time. In order for this hypothesis to be confirmed, females would need to have significantly higher mean scores on the time management behavior scales (goal setting and prioritizing, mechanics, preference for organization, short-range planning) while also having significantly lower mean scores on the scales representing their attitudes toward their perceived control of time (perceived control of time and time attitudes). For the TMBS, Hypothesis 1 was not supported because the mean scores of females were not significantly lower than males on the perceived control

of time scale. It should be noted that females did engage in significantly more time management behaviors according to the mechanics and preference for organization subfactors of the TMBS; however, the scores on the perceived control of time scale were virtually the same. Given the concerns previously raised about the perceived control of time scale, it would be prudent for future research to explore this finding again. Specifically, a revision of the perceived control of time scale may be necessary to model it successfully using IRT methods. Those revisions may result in a finding more consistent with the hypothesized relationships. On the other hand, Hypothesis 1 was supported with the TMQ. Females reported significantly higher means on the short-range planning scale while also reporting significantly lower scores on the time attitudes scale of the TMQ. Given the concern raised previously about the fit of these items using IRT methods and the mediocre model fit of the time attitudes scale using CFA methods, these results should be viewed with caution. However, these findings may support the idea of combining items from the TMBS and TMQ to create a more universal scale that would be better able to capture a range of time management behaviors and attitudes toward time management. That is, the combination of the time management behaviors of mechanics, preference for organization, and short-range planning were found to be significantly different across genders and the time attitude scale also captured mean differences between genders.

Next, the second hypothesis states that adults in late adulthood will score higher on time management behaviors than those in early adulthood (2a) and middle adulthood (2b), and that those in middle adulthood will score higher on time management behaviors than those in early adulthood (2c). For the testing of Hypothesis 2, all items that failed the

equivalency testing for any set of age groups were not considered. In addition, only those scales that measure time management behaviors were used. As a result, testing took place with the goal setting and prioritization and mechanics subfactors of the TMBS, the short-range planning subfactor of the TMQ, and the effective organization and structured routine subfactors of the TSQ. Notably, between the different age categories, there were many items that were found to lack equivalence. Previous research using these items may have been picking up on these statistical artifacts instead of true differences. Further, the fact that the early versus later age groups had the largest number of items without measurement equivalence could be indicative of problems with the wording of the items. Perhaps the items are worded in such a way that it does not translate across multiple generations. Alternatively, the lack of equivalence in these items may be indicative of an overall difference in how different age groups interpret the construct of time management. As noted in the theoretical development of Hypothesis 2, older adults may interpret the use of time management behaviors in a different way than their younger counterparts due to the accumulation of experience and necessity to overcome certain cognitive failures.

For the testing of Hypothesis 2 specifically, there were several factors identified that may influence the use of time management behaviors that need to be considered as possible confounding variables. First, individuals with higher levels of conscientiousness may exhibit more time management behaviors as they are characterized as more detail oriented. In addition, as an individual's job becomes more complex, they may find more of a need for time management behaviors. Similarly, the stage of a person's career may influence their use of time management behaviors. Finally, memory has been found to be

significantly correlated to time management behaviors in this and previous studies (Macan et al., 2010), which may lead to a confounding of the results. Overall, testing revealed that those in the older age groups do not have significantly higher scores on time management behaviors than their younger counterparts. In fact, contrary to the hypothesized relationships, those in the early age categories reported significantly more goal setting and prioritization and short-range planning behaviors than those in middle adulthood.

This result could be due to the need for planning and setting goals to move forward in careers at an early age, while those in middle adulthood have already mapped out their goals and plans. Alternatively, those in the middle age group could have more things going on in their lives that do not allow for a focus on goal setting and planning behaviors, such as family responsibilities. As these results are contrary to the expected, future research should explore this relationship in more detail. In addition, as previously mentioned, the number of items and measures in total that were not equivalent across the early and later age groups is concerning. Future research should explore this hypothesis again once the measures have been adapted to address the time management of individuals across varying age groups.

The current study also sought to address the question of whether differences in temporal awareness would result in different interpretations of time management surveys, as well as the actual use of time management behaviors (Aeon & Aguinis, 2017). In order to answer this question, the current study developed a measure of temporal awareness by adapting Soman's (2001) mental accounting of time and money measure. A person who had a significant difference in whether they valued money as a resource more so than

time were considered to be low in temporal awareness. On the other hand, if an individual did not show a significant difference in how they valued money and time as a resource, they were considered to be high in temporal awareness. As previously mentioned, a small group of individuals were classified as being higher in temporal awareness because they valued time as a resource more than money. For the purposes of this study, those individuals were collapsed into the high temporal awareness group. However, this finding is interesting since the current literature on temporal awareness has not considered this group would exist. It is possible that individuals of advanced age would view time as more of a resource than money as they see the years declining and perhaps have much they still wish to accomplish. Meanwhile, they may feel they have enough money or put less of an emphasis on it as time has passed. Further investigation of this group revealed that the age range spanned from 18 to 69, with only seven in the over 50 age group, so it does not appear that the difference is related to age. However, this is a small group and this idea bears further investigation with a larger group to determine if age is a significant factor in temporal awareness. No other information was present in the current study to investigate further the reason for this additional group and future research should address it.

In order to determine if individuals across levels of temporal awareness interpreted measures of time management in the same way, a combination of IRT differential functioning analysis and CFA measurement equivalence testing was used. Overall, the TMBS and TMQ measures appeared to function similarly across groups. An exception is the preference for organization scale of the TMBS with two items that were not equivalent across groups. In addition, it is notable that one item of the structured

routine scale, and the effective organization, present orientation, and persistence subfactors of the TSQ were not equivalent across groups. This means that the majority of the TSQ was unable to be tested for mean differences across these groups. When testing for significant mean differences between low and high levels of temporal awareness, only the preference for organization scale of the TMBS was indicated. Contrary to expectations, the low temporal awareness groups reported significantly higher scores for this scale than the high temporal awareness group. Items in this scale focus more on the organization of desk items and thoughts than specific time management behaviors, like those in the mechanics or goal setting and prioritization scales. It could be that those who do not value time as a resource are focusing on organization as opposed to some of the specific time management techniques. While few significant results were noted for differences in temporal awareness, further research in this area is warranted.

Finally, the current study sought to determine the best model fit for the time management measures. Previous research has demonstrated that non-cognitive measures have better model fit and greater reliability across the trait continuum when an ideal point model is used (Stark et al., 2006; Carter et al., 2014). Some limited research suggested that time management may be dispositional in nature (Shahani et al., 1993; Claessens et al., 2007) and thus, time management measures may benefit from an ideal point model. However, in the current study it was determined that the ideal point model did not have a better fit than the dominance response model for this data. Given this finding, more confidence can be placed in the current measures, as well as the past findings associated with those measures.

Along those lines, the current study sought to compare the TMBS, TMQ, and TSQ to determine if they would generate comparable results. As noted in the discussion prior to the ad hoc analysis, each measure (TMBS, TMQ, TSQ) displayed some items of concern. As a result, the current study sought to combine viable items into one measure following categories proposed by Claessens et al. (2007). The results from the ad hoc analysis are promising as the measures displayed good model fit with a few modifications noted during CFA. However, a few items were noted as lacking adequate fit during IRT analyses that may require revision in future research. Overall, the measure appears to be a good start toward the development of a universal measure of time management.

**Limitations**

With any study there are limitations and the current study is no exception. A primary limitation is the use of self-report measures. It is possible that individuals do not have an accurate representation of their time management behaviors. Future research may consider a field study where supervisors or peers measure the time management behaviors of the participant. A comparison between the participant and other ratings may provide some insight into how well the self-report time management measures operate. Along those lines, other variables not measured may factor into the results. For instance, previous experience with time management training may cause an individual to interpret the measures in a different way.

Additionally, the questionnaire for this study was over 100 items which could have resulted in test-taker fatigue. The money and time statements for the temporal awareness scale were set to be at the beginning and end of the questionnaire to avoid a priming effect given they have the same content with alternate subjects. Meanwhile, the

remaining scales were set to be random to attempt to reduce error in one particular scale. However, there were three different scales attempting to measure time management and it is possible that there may have been some fatigue associated with that. In addition, there may have been some carry-over effects from one scale to the other relating to time management. As a result, it would be prudent for future research to attempt to replicate these results.

Another area of note in regard to the current study is that there were several items that did not meet the guidelines for an acceptable fit. For instance, all items of the perceived control of time scale exceeded the cutoff for acceptable fit. Future research might consider using alternative IRT models when assessing this scale. Similarly, the majority of the items of the short-range planning and time attitudes subfactors of the TMQ, and all of the items of the TSQ exceeded the cutoff for acceptable fit. As such, these scales may also need to be assessed with alternative IRT models in the future. For the purposes of the current study, these items were viewed with caution when interpreting results. It should also be noted that the TSQ displayed negative correlations with the other time management scales which is not in line with previous research (Shahani et al., 1993; Macan et al., 2010). As such, the results from the TSQ in this study should be interpreted with caution. As explained in the measurement section, it should also be reiterated that the long-range planning subfactor was not found to be suitable to continue any kind of testing for this study. Future work should confirm these results and consider dropping those items from the TMQ.

Another area of concern noted during the equivalence testing is the number of items flagged as not being equivalent across gender and across the early and later age

groups on the mechanics subfactor of the TMBS. There were seven items (64%) flagged in the equivalence testing across gender and six items (55%) flagged in the equivalence testing across early and later age groups. Future research should investigate this measure thoroughly to ensure its integrity. It is possible that several items in this scale require revision in order to adequately capture the use of time management mechanics uniformly across various groups of individuals. Similarly, the short-range planning subfactor of the TMQ had three items (43%) flagged as not being equivalent across gender and four items (57%) flagged in the equivalence testing across early and later age groups. In addition, several scales (preference for organization, time attitudes, sense of purpose, and persistence) were identified as not being equivalent across the early and later age groups. Future research should consider revising the wording of these items to more adequately relate to varying age groups. Finally, the present orientation and persistence subfactors of the TSQ were not equivalent across most of the groups of interest. These scales should be considered for revision in the future and the addition of more items to the scales may be beneficial.

Another limitation that should be noted with the time management scales is that they were all created more than twenty years ago and may have some items that are out of date and potentially unrelatable to the current generation. Some attempts were made to update items of the TMBS that referred to a paper planner or schedule by adding wording related to computer related time management systems (i.e., phone), but the wording could have influenced responses. In fact, it was noted during equivalence testing that several items were flagged for the early versus later age categories. Future research may want to

consider revising items of the time management scales to make them more applicable to current times.

**Future Directions**

The results of this study address several limitations noted in the current literature and should spearhead future research with its findings. First of all, the current study found several items in each of the measures that were not equivalent across the groups of interest. Future research will need to remove these items before testing group differences. As the exploration of individual differences in time management has been identified as a necessity in the time management literature (Aeon & Aguinis, 2017; Claeesens et al., 2009), the identification of these items was an important first step. Along those lines, future research should explore mean differences between gender and age groups further as some of the results in this study were not in line with the hypothesized relationships. Specifically, future research may want to consider a qualitative study gathering time management definitions to determine if (1) our current definition of time management is appropriate, and if (2) definitions of time management are substantively similar across groups. Another area not considered in the current study that may need to be evaluated in this future research is cultural differences in the definition of time management.

Another important contribution of this study that merits further research is the results related to temporal awareness. This study appears to be the first to try to develop and test a measure of temporal awareness. Further research on the efficacy of this measure and support for the findings related to differences in time management use across temporal awareness levels is necessary. One area of concern for the current study is the contrary findings related to the large number of people identified as high versus

low in temporal awareness. Previous research indicated that mean agreement with the money statements was greater than the mean agreement with the time statements which would indicate that there should have been a larger number of individuals in the low temporal awareness category (Soman, 2001). It is possible this result was a consequence of a measurement technique that is not appropriate. However, another alternative is that the individuals in this study were more accustomed to measuring their time in terms of money. As noted previously, individuals who are accustomed to working contractually or for an hourly wage are more likely to view their time in monetary terms (Soman, 2001; Devoe & Pfeffer, 2007). Given that MTurk workers are paid for tasks that have an estimated completion time, they may be accustomed to valuing their time in monetary terms. Future research may need to seek out a different population of people to test in order to determine if the ratio of high and low temporal awareness individuals is comparable to the current study. In addition, the small group of individuals identified as valuing time more than money merit further research. One avenue to consider is the income of those in each level of temporal awareness. It is possible that the income bracket of those in the higher temporal awareness group is a factor as they may feel they have enough money but not enough time. Income range was not collected for this study so future work may want to explore this possibility. It appears the current study is the first to explore the concept of temporal awareness as it relates to time management so there is still much to investigate in this realm. Certainly, this group of individuals who value time more than money should be explored in more detail with the opportunity to explore more factors that may influence this relationship. Future research should target a wider range of ages and collect additional demographic information. In addition, Aeon

and Aguinis (2017) note the possibility of range restriction given those who value time the most may be unwillingly to use their time to complete a survey for a nominal amount of money. Future research may need to consider methods of enticing individuals who value their time to take the survey to increase the range of participants. Temporal awareness could be an important difference to understand as it could affect the use of time management techniques as well as outcomes associated with better time management.

Finally, some results of this study indicate that a combination of the TMBS, TMQ, and TSQ could result in a better universal measure of time management. Several items were noted on these measures as not equivalent across gender, age, and temporal awareness and could be considered for removal. By combining the measures, a more comprehensive look at various aspects of time management and time attitudes may be achieved. An attempt was made in the current study to create a universal measure. While the measure displays adequate fit and appears to capture many elements of previously proposed categories of time management, future research would need to confirm these results. In addition, future research could test various other combinations of the measures and outcomes sometimes associated with time management (i.e., productivity, well-being). Meanwhile, wording of the items could be updated to reflect current methods of time management during the combination of the measures. By continuing time management research with this proposed measure of time management, the lack of a clear conceptualization of time management cited in the literature (Claessens et al., 2007) would be addressed.

## Conclusion

Some interesting insights may be derived from the current study as it relates to the time management measures currently popular in the literature. Additional confidence may be placed in these measures as they do appear to follow a dominance response process as they were intended. In addition, several items were identified as not equivalent across gender, age, and temporal awareness which will inform future research when testing mean differences in these areas. Further, the first steps toward understanding temporal awareness and its relationship with time management was achieved. Finally, a universal measure based on Claessens et al. (2007) proposed definition of time management which utilizes items from the existing time management measures has undergone initial testing. The results were promising and may provide future research with a path toward a universal conceptualization of time management.

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## TABLES

Table 1

*Means, standard deviations, and correlations of study variables*

| Scale | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Age | 39.88 | 10.56 | - | | | | | | | | |
| 2 Gender | 1.56 | 0.50 | 0.08** | - | | | | | | | |
| 3 Temporal | 1.81 | 0.47 | -0.06* | -0.05 | - | | | | | | |
| 4 TMBS GP | 3.59 | 0.67 | 0.03 | 0.01 | 0.03 | (0.86) | | | | | |
| 5 TMBS M | 2.99 | 0.79 | 0.01 | 0.17** | -0.02 | 0.56** | (0.83) | | | | |
| 6 TMBS PO | 3.82 | 0.76 | 0.19** | 0.12** | -0.15** | 0.24** | 0.20** | (0.79) | | | |
| 7 PCT | 3.43 | 0.79 | 0.12** | -0.01 | -0.03 | 0.29** | 0.13** | 0.57** | (0.71) | | |
| 8 TMQ Total | 3.09 | 0.52 | 0.08** | 0.07* | -0.04 | 0.62** | 0.66** | 0.44** | 0.48** | (0.82) | |
| 9 TMQ SRP | 3.14 | 0.81 | 0.05 | 0.12** | -0.05 | 0.57** | 0.73** | 0.30** | 0.22** | 0.88** | (0.89) |
| 10 TMQ LRP | 2.93 | 0.59 | 0.02 | 0.04 | 0.03 | 0.45** | 0.37** | 0.35** | 0.40** | 0.71** | 0.44** |
| 11 TMQ TA | 3.16 | 0.57 | 0.13** | -0.05 | -0.04 | 0.31** | 0.16** | 0.41** | 0.65** | 0.60** | 0.23** |
| 12 TSQ Total | 3.96 | 0.70 | -0.21** | -0.03 | 0.04 | -0.45** | -0.28** | -0.49** | -0.67** | -0.61** | -0.37** |
| 13 TSQ EO | 4.35 | 1.19 | -0.16** | -0.02 | 0.04 | -0.36** | -0.13** | -0.46** | -0.60** | -0.43** | -0.20** |
| 14 TSQ SP | 4.06 | 1.08 | -0.21** | -0.04 | 0.05 | -0.33** | -0.21** | -0.40** | -0.57** | -0.47** | -0.27** |
| 15 TSQ SR | 2.87 | 0.79 | -0.10** | -0.07* | 0.03 | -0.50** | -0.45** | -0.37** | -0.36** | -0.66** | -0.59** |
| 16 TSQ PO | 5.17 | 0.85 | -0.20** | -0.01 | -0.03 | -0.07* | -0.02 | -0.17** | -0.35** | -0.17** | 0.01 |
| 17 TSQ P | 3.52 | 1.02 | -0.17** | 0.03 | 0.08** | -0.39** | -0.18** | -0.40** | -0.54** | -0.46** | -0.27** |
| 18 PRMQ PRO | 2.52 | 0.68 | -0.11** | 0.12** | 0.01 | -0.21** | -0.01 | -0.33** | -0.48** | -0.29** | -0.09** |
| 19 PRMQ RET | 2.21 | 0.62 | -0.15** | 0.03 | 0.05 | -0.15** | 0.01 | -0.36** | -0.39** | -0.23** | -0.08** |
| 20 Career: Explore | 2.75 | 1.33 | -0.26** | 0.03 | 0.04 | -0.03 | -0.01 | -0.18** | -0.22** | -0.13** | -0.00 |
| 21 Career: Establish | 2.98 | 1.20 | -0.24** | 0.03 | 0.06* | 0.05 | 0.06** | -0.16** | -0.20** | -0.05 | 0.73** |
| 22 Career: Maintain | 2.74 | 1.12 | -0.09** | 0.06* | 0.07* | 0.13** | 0.16** | -0.13** | -0.12** | 0.06* | 0.14** |
| 23 Career: Decline | 3.48 | 1.01 | 0.03 | 0.10** | -0.03 | 0.11** | 0.12** | -0.04 | -0.11** | 0.04 | 0.12** |
| 24 Consc | 3.76 | 0.91 | 0.15** | -0.01 | -0.02 | 0.39** | 0.25** | 0.55** | 0.54** | 0.53** | 0.32** |
| 25 Job Com | 3.51 | 0.91 | 0.08** | 0.01 | -0.03 | 0.33** | 0.31** | 0.06* | 0.12** | 0.34** | 0.34** |

*Note.* Temporal = Temporal Awareness, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ LRP = Long-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence, PRMQ = Prospective and Retrospective Memory Questionnaire, PRMQ PRO = Prospective Memory, PRMQ RET = Retrospective Memory, Career = Adult Career Concerns Inventory, Consc = Conscientiousness, Job Com = Job Complexity; Values in parentheses are Cronbach's alpha for each scale; N = 1,247; Smaller scores on the PRMQ represent better memory or less failures; All scales have a 5-point range with the exception of the TSQ which uses a 7-point scale
*$p$<.05 **$p$<.01

*Means, standard deviations, and correlations of study variables*

| Scale | *M* | *SD* | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Age | 39.88 | 10.56 | | | | | | | | | |
| 2 Gender | 1.56 | 0.50 | | | | | | | | | |
| 3 Temporal | 1.81 | 0.47 | | | | | | | | | |
| 4 TMBS GP | 3.59 | 0.67 | | | | | | | | | |
| 5 TMBS M | 2.99 | 0.79 | | | | | | | | | |
| 6 TMBS PO | 3.82 | 0.76 | | | | | | | | | |
| 7 PCT | 3.43 | 0.79 | | | | | | | | | |
| 8 TMQ Total | 3.09 | 0.52 | | | | | | | | | |
| 9 TMQ SRP | 3.14 | 0.81 | | | | | | | | | |
| 10 TMQ LRP | 2.93 | 0.59 | (0.19) | | | | | | | | |
| 11 TMQ TA | 3.16 | 0.57 | 0.39** | (0.61) | | | | | | | |
| 12 TSQ Total | 3.96 | 0.70 | -0.47** | -0.66** | (0.90) | | | | | | |
| 13 TSQ EO | 4.35 | 1.19 | -0.37** | -0.56** | 0.86** | (0.81) | | | | | |
| 14 TSQ SP | 4.06 | 1.08 | -0.34** | -0.54** | 0.86** | 0.66** | (0.81) | | | | |
| 15 TSQ SR | 2.87 | 0.79 | -0.46** | -0.36** | 0.58** | 0.35** | 0.37** | (0.68) | | | |
| 16 TSQ PO | 5.17 | 0.85 | -0.18** | -0.38** | 0.57** | 0.45** | 0.46** | 0.05 | (0.65) | | |
| 17 TSQ P | 3.52 | 1.02 | -0.34** | -0.52** | 0.79** | 0.72** | 0.60** | 0.36** | 0.37** | (0.71) | |
| 18 PRMQ PRO | 2.52 | 0.68 | -0.27** | -0.44** | 0.57** | 0.58** | 0.45** | 0.25** | 0.31** | 0.49** | (0.87) |
| 19 PRMQ RET | 2.21 | 0.62 | -0.18** | -0.37** | 0.53** | 0.55** | 0.43** | 0.21** | 0.28** | 0.45** | 0.79** |
| 20 Career: Explore | 2.75 | 1.33 | -0.08** | -0.30** | 0.32** | 0.26** | 0.32** | 0.10** | 0.33** | 0.20** | 0.18** |
| 21 Career: Establish | 2.98 | 1.20 | -0.05 | -0.26** | 0.26** | 0.23** | 0.26** | 0.05 | 0.34** | 0.15** | 0.16** |
| 22 Career: Maintain | 2.74 | 1.12 | 0.04 | -0.15** | 0.10** | 0.12** | 0.11** | -0.07** | 0.21** | 0.02 | 0.08** |
| 23 Career: Decline | 3.48 | 1.01 | -0.01 | -0.13** | 0.10** | 0.11** | 0.11** | -0.08** | 0.25** | 0.02 | 0.08** |
| 24 Consc | 3.76 | 0.91 | 0.54** | 0.49** | -0.59** | -0.53** | -0.41** | -0.43** | -0.28** | -0.49** | -0.43** |
| 25 Job Com | 3.51 | 0.91 | 0.20** | 0.15** | -0.27** | -0.15** | -0.25** | -0.29** | -0.06* | -0.23** | -0.07* |

*Means, standard deviations, and correlations of study variables*

| Scale | *M* | *SD* | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|
| 1 Age | 39.88 | 10.56 | | | | | | | |
| 2 Gender | 1.56 | 0.50 | | | | | | | |
| 3 Temporal | 1.81 | 0.47 | | | | | | | |
| 4 TMBS GP | 3.59 | 0.67 | | | | | | | |
| 5 TMBS M | 2.99 | 0.79 | | | | | | | |
| 6 TMBS PO | 3.82 | 0.76 | | | | | | | |
| 7 PCT | 3.43 | 0.79 | | | | | | | |
| 8 TMQ Total | 3.09 | 0.52 | | | | | | | |
| 9 TMQ SRP | 3.14 | 0.81 | | | | | | | |
| 10 TMQ LRP | 2.93 | 0.59 | | | | | | | |
| 11 TMQ TA | 3.16 | 0.57 | | | | | | | |
| 12 TSQ Total | 3.96 | 0.70 | | | | | | | |
| 13 TSQ EO | 4.35 | 1.19 | | | | | | | |
| 14 TSQ SP | 4.06 | 1.08 | | | | | | | |
| 15 TSQ SR | 2.87 | 0.79 | | | | | | | |
| 16 TSQ PO | 5.17 | 0.85 | | | | | | | |
| 17 TSQ P | 3.52 | 1.02 | | | | | | | |
| 18 PRMQ PRO | 2.52 | 0.68 | | | | | | | |
| 19 PRMQ RET | 2.21 | 0.62 | (0.83) | | | | | | |
| 20 Career: Explore | 2.75 | 1.33 | 0.16** | (0.92) | | | | | |
| 21 Career: Establish | 2.98 | 1.20 | 0.15** | 0.79** | (0.83) | | | | |
| 22 Career: Maintain | 2.74 | 1.12 | 0.08** | 0.46** | 0.65** | (0.84) | | | |
| 23 Career: Decline | 3.48 | 1.01 | 0.06* | 0.37** | 0.53** | 0.56** | (0.73) | | |
| 24 Consc | 3.76 | 0.91 | -0.40** | -0.16** | -0.14** | -0.08** | -0.02 | (0.77) | |
| 25 Job Com | 3.51 | 0.91 | -0.07* | -0.10** | 0.01 | 0.20** | 0.10** | 0.16** | (0.76) |

Table 2

*Item-level fit for the GRM and GGUM*

| | | GRM | | | | GGUM | | | |
|---|---|---|---|---|---|---|---|---|---|
| Item | | $\chi^2$ | *df* | $\chi^2/df$ | RMSEA | $\chi^2$ | *df* | $\chi^2/df$ | RMSEA |
| TMBS GP | 1 | 50.35 | 24 | 2.10 | 0.030 | 247.56 | 20 | 12.38 | 0.096 |
| | 2 | 58.84 | 27 | 2.18 | 0.031 | 288.35 | 21 | 13.73 | 0.101 |
| | 3 | 49.90 | 26 | 1.92 | 0.027 | 306.72 | 17 | 18.04 | 0.117 |
| | 4 | 49.67 | 26 | 1.91 | 0.027 | 239.59 | 19 | 12.61 | 0.097 |
| | 5 | 49.39 | 24 | 2.06 | 0.029 | 339.82 | 21 | 16.18 | 0.110 |
| | 6 | 95.92 | 25 | 3.84 | 0.048 | 207.22 | 19 | 10.91 | 0.089 |
| | 7 | 44.19 | 26 | 1.70 | 0.024 | 175.55 | 22 | 7.98 | 0.075 |
| | 8 | 54.35 | 29 | 1.87 | 0.026 | 565.04 | 21 | 26.91 | 0.144 |
| | 9 | 54.02 | 27 | 2.00 | 0.028 | 519.71 | 19 | 27.35 | 0.145 |
| | 10 | 49.27 | 27 | 1.82 | 0.026 | 297.07 | 22 | 13.50 | 0.100 |
| TMBS M | 1 | 55.51 | 30 | 1.85 | 0.026 | 512.53 | 26 | 19.71 | 0.123 |
| | 2 | 50.44 | 33 | 1.53 | 0.021 | 193.73 | 30 | 6.46 | 0.066 |
| | 3 | 63.33 | 35 | 1.81 | 0.025 | 138.06 | 34 | 4.06 | 0.050 |
| | 4 | 61.44 | 35 | 1.76 | 0.025 | 221.87 | 30 | 7.40 | 0.070 |
| | 5 | 60.56 | 27 | 2.24 | 0.032 | 505.34 | 16 | 31.58 | 0.168 |
| | 6 | 50.81 | 27 | 1.88 | 0.027 | 440.77 | 22 | 20.04 | 0.124 |
| | 7 | 60.51 | 32 | 1.89 | 0.027 | 519.11 | 30 | 17.30 | 0.116 |
| | 8 | 50.87 | 29 | 1.75 | 0.024 | 355.15 | 29 | 12.25 | 0.093 |
| | 9 | 64.54 | 34 | 1.90 | 0.027 | 1163.82 | 32 | 36.37 | 0.163 |
| | 10 | 65.20 | 34 | 1.92 | 0.027 | 139.55 | 30 | 4.65 | 0.054 |
| | 11 | 75.51 | 35 | 2.16 | 0.030 | 138.55 | 34 | 4.07 | 0.050 |
| TMBS PO | 1 | 69.91 | 30 | 2.33 | 0.033 | 84.23 | 28 | 3.01 | 0.040 |
| | 2 | 86.41 | 32 | 2.70 | 0.037 | 79.15 | 30 | 2.64 | 0.036 |
| | 3 | 92.16 | 19 | 4.85 | 0.056 | 105.93 | 18 | 5.88 | 0.063 |
| | 4 | 70.44 | 24 | 2.93 | 0.039 | 84.87 | 23 | 3.69 | 0.046 |
| | 5 | 56.71 | 29 | 1.96 | 0.028 | 66.30 | 26 | 2.55 | 0.035 |
| | 6 | 52.24 | 28 | 1.87 | 0.026 | 64.68 | 25 | 2.59 | 0.036 |
| | 7 | 76.78 | 35 | 2.19 | 0.031 | 75.06 | 34 | 2.21 | 0.031 |
| | 8 | 50.32 | 25 | 2.01 | 0.029 | 48.21 | 21 | 2.30 | 0.032 |
| PCT | 1 | 108.99 | 33 | 3.30 | 0.043 | 512.42 | 28 | 18.30 | 0.118 |
| | 2 | 104.20 | 29 | 3.59 | 0.046 | 1182.08 | 19 | 62.21 | 0.222 |
| | 3 | 82.51 | 33 | 2.50 | 0.035 | 759.99 | 26 | 29.23 | 0.151 |
| | 4 | 139.32 | 37 | 3.77 | 0.058 | 736.60 | 19 | 38.77 | 0.174 |
| | 5 | 128.24 | 32 | 4.01 | 0.049 | 1361.53 | 26 | 52.37 | 0.203 |
| TMQ-SRP | 1 | 66.24 | 18 | 3.68 | 0.046 | 91.96 | 16 | 5.75 | 0.059 |
| | 2 | 55.02 | 17 | 3.24 | 0.042 | 78.29 | 16 | 4.89 | 0.058 |
| | 3 | 61.10 | 18 | 3.39 | 0.044 | 120.56 | 15 | 8.04 | 0.075 |
| | 4 | 100.12 | 23 | 4.35 | 0.052 | 1167.70 | 21 | 55.60 | 0.164 |
| | 5 | 64.24 | 16 | 4.02 | 0.049 | 107.52 | 14 | 7.68 | 0.068 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 6 | 68.64 | 26 | 2.64 | 0.036 | 83.26 | 23 | 3.62 | 0.046 |
| | 7 | 67.69 | 29 | 2.33 | 0.033 | 60.09 | 26 | 2.31 | 0.032 |
| TMQ-TA | 1 | 138.95 | 33 | 4.21 | 0.051 | 246.79 | 28 | 8.81 | 0.079 |
| | 2 | 117.37 | 28 | 4.19 | 0.051 | 543.00 | 21 | 25.86 | 0.141 |
| | 3 | 105.34 | 26 | 4.05 | 0.049 | 356.24 | 27 | 13.19 | 0.099 |
| | 4 | 225.06 | 20 | 11.25 | 0.091 | 519.70 | 15 | 34.65 | 0.164 |
| | 5 | 197.24 | 25 | 7.89 | 0.074 | 416.60 | 24 | 17.36 | 0.115 |
| TSQ-EO | 1 | 101.09 | 22 | 4.60 | 0.054 | 3865.79 | 24 | 161.07 | 0.358 |
| | 2 | 80.55 | 18 | 4.47 | 0.053 | 12033.27 | 24 | 501.39 | 0.634 |
| | 3 | 156.55 | 21 | 7.45 | 0.072 | 1260.20 | 14 | 90.01 | 0.267 |
| | 4 | 163.04 | 16 | 10.19 | 0.086 | 836.89 | 14 | 59.78 | 0.217 |
| TSQ-SR | 1 | 104.59 | 17 | 6.15 | 0.064 | 406.54 | 24 | 16.94 | 0.113 |
| | 2 | 78.18 | 20 | 3.91 | 0.048 | 92.01 | 18 | 5.11 | 0.057 |
| | 3 | 93.59 | 23 | 4.07 | 0.050 | 152.38 | 19 | 8.02 | 0.075 |
| | 4 | 139.99 | 49 | 2.86 | 0.039 | 347.22 | 44 | 7.89 | 0.074 |
| | 5 | 207.80 | 31 | 6.70 | 0.068 | 219.78 | 31 | 7.09 | 0.070 |
| TSQ-SP | 1 | 100.70 | 20 | 5.03 | 0.057 | 1403.37 | 18 | 77.97 | 0.180 |
| | 2 | 73.89 | 16 | 4.62 | 0.054 | 267.37 | 14 | 19.10 | 0.112 |
| | 3 | 103.66 | 24 | 4.32 | 0.052 | 227.21 | 22 | 10.33 | 0.089 |
| | 4 | 90.82 | 19 | 4.78 | 0.055 | 216.59 | 18 | 12.03 | 0.089 |
| | 5 | 105.25 | 14 | 7.52 | 0.072 | 260.74 | 12 | 21.73 | 0.129 |
| TSQ-PO | 1 | 296.73 | 18 | 16.49 | 0.111 | 317.04 | 16 | 19.82 | 0.123 |
| | 2 | 623.82 | 30 | 20.79 | 0.126 | 748.20 | 26 | 28.78 | 0.149 |
| | 3 | 183.82 | 12 | 15.32 | 0.107 | 227.40 | 12 | 18.95 | 0.120 |
| TSQ-P | 1 | 246.25 | 17 | 14.49 | 0.104 | 280.42 | 10 | 28.04 | 0.147 |
| | 2 | 300.20 | 14 | 21.44 | 0.128 | 321.33 | 15 | 21.42 | 0.128 |
| | 3 | 220.73 | 14 | 15.77 | 0.109 | 406.58 | 15 | 27.11 | 0.145 |

*Note.* RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 3

*Gender: Differential Item Functioning Statistics and Effect Sizes*

| Item | | $\chi^2_{12}$ | *df* | $R^2_{12}$ | $\chi^2_{13}$ | *df* | $R^2_{13}$ | $\chi^2_{23}$ | *df* | $R^2_{23}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| TMBS GP | 4 | 0.116 | 1 | 0.001 | 0.000 | 2 | 0.008 | 0.000 | 1 | 0.007 |
| | 8 | 0.000 | 1 | 0.014 | 0.000 | 2 | 0.014 | 0.807 | 1 | 0.000 |
| | 9 | 0.000 | 1 | 0.004 | 0.002 | 2 | 0.043 | 0.793 | 1 | 0.000 |
| TMBS M | 4 | 0.007 | 1 | 0.004 | 0.004 | 2 | 0.007 | 0.052 | 1 | 0.002 |
| | 5 | 0.000 | 1 | 0.006 | 0.000 | 2 | 0.008 | 0.018 | 1 | 0.002 |
| | 7 | 0.000 | 1 | 0.005 | 0.000 | 2 | 0.009 | 0.004 | 1 | 0.003 |
| | 8 | 0.000 | 1 | 0.012 | 0.000 | 2 | 0.012 | 0.372 | 1 | 0.000 |
| | 10 | 0.001 | 1 | 0.008 | 0.001 | 2 | 0.009 | 0.244 | 1 | 0.001 |
| PCT | 5 | 0.000 | 1 | 0.005 | 0.000 | 2 | 0.006 | 0.142 | 1 | 0.001 |
| TMQ-SRP | 4 | 0.000 | 1 | 0.006 | 0.000 | 2 | 0.012 | 0.007 | 1 | 0.001 |
| | 5 | 0.000 | 1 | 0.006 | 0.000 | 2 | 0.009 | 0.006 | 1 | 0.000 |
| | 7 | 0.002 | 1 | 0.006 | 0.003 | 2 | 0.006 | 0.007 | 1 | 0.001 |
| TMQ-TA | 1 | 0.005 | 1 | 0.004 | 0.000 | 2 | 0.009 | 0.005 | 1 | 0.004 |
| | 4 | 0.000 | 1 | 0.005 | 0.000 | 2 | 0.005 | 0.865 | 1 | 0.000 |
| TSQ-EO | 2 | 0.000 | 1 | 0.004 | 0.001 | 2 | 0.004 | 0.951 | 1 | 0.000 |
| | 3 | 0.012 | 1 | 0.002 | 0.000 | 2 | 0.004 | 0.001 | 1 | 0.002 |

*Note.* $\chi^2_{12}$ compares logistic models 1 and 2; $\chi^2_{13}$ compares logistic models 1 and 3; $\chi^2_{23}$ compares logistic models 2 and 3; $R^2$ = the difference between two generalized coefficients of determination (Cox & Snell, 1989)

Table 4

*Early versus Middle Age: Differential Item Functioning Statistics and Effect Sizes*

| Item | | $\chi^2_{12}$ | *df* | $R^2_{12}$ | $\chi^2_{13}$ | *df* | $R^2_{13}$ | $\chi^2_{23}$ | *df* | $R^2_{23}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| TMBS GP | 7 | 0.003 | 1 | 0.006 | 0.009 | 2 | 0.007 | 0.379 | 1 | 0.000 |
| TMBS M | 6 | 0.000 | 1 | 0.004 | 0.000 | 2 | 0.009 | 0.000 | 1 | 0.004 |
| TMBS PO | 2 | 0.001 | 1 | 0.009 | 0.003 | 2 | 0.009 | 0.772 | 1 | 0.000 |
| | 3 | 0.000 | 1 | 0.006 | 0.000 | 2 | 0.006 | 0.174 | 1 | 0.001 |
| | 7 | 0.247 | 1 | 0.001 | 0.002 | 2 | 0.009 | 0.001 | 1 | 0.008 |
| PCT | 3 | 0.004 | 1 | 0.006 | 0.000 | 2 | 0.018 | 0.000 | 1 | 0.013 |
| TMQ-SRP | 4 | 0.000 | 1 | 0.005 | 0.001 | 2 | 0.005 | 0.649 | 1 | 0.000 |
| | 6 | 0.001 | 1 | 0.007 | 0.004 | 2 | 0.007 | 0.831 | 1 | 0.000 |
| | 7 | 0.007 | 1 | 0.006 | 0.021 | 2 | 0.006 | 0.466 | 1 | 0.000 |
| TSQ-EO | 2 | 0.000 | 1 | 0.004 | 0.001 | 2 | 0.004 | 0.951 | 1 | 0.000 |
| | 3 | 0.012 | 1 | 0.002 | 0.000 | 2 | 0.004 | 0.001 | 1 | 0.002 |

*Note*. $\chi^2_{12}$ compares logistic models 1 and 2; $\chi^2_{13}$ compares logistic models 1 and 3; $\chi^2_{23}$ compares logistic models 2 and 3; $R^2$ = the difference between two generalized coefficients of determination (Cox & Snell, 1989)

Table 5

*Middle versus Later Age: Differential Item Functioning Statistics and Effect Sizes*

| Item | | $\chi^2_{12}$ | *df* | $R^2_{12}$ | $\chi^2_{13}$ | *df* | $R^2_{13}$ | $\chi^2_{23}$ | *df* | $R^2_{23}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| TMBS M | 1 | 0.000 | 1 | 0.007 | 0.000 | 2 | 0.008 | 0.392 | 1 | 0.000 |
| | 3 | 0.000 | 1 | 0.005 | 0.000 | 2 | 0.022 | 0.355 | 1 | 0.001 |
| TMBS PO | 4 | 0.261 | 1 | 0.001 | 0.000 | 2 | 0.009 | 0.000 | 1 | 0.008 |
| | 7 | 0.001 | 1 | 0.010 | 0.002 | 2 | 0.011 | 0.351 | 1 | 0.001 |
| PCT | 3 | 0.247 | 1 | 0.001 | 0.000 | 2 | 0.013 | 0.000 | 1 | 0.012 |
| TSQ-EO | 2 | 0.000 | 1 | 0.004 | 0.001 | 2 | 0.004 | 0.951 | 1 | 0.000 |
| | 3 | 0.012 | 1 | 0.002 | 0.000 | 2 | 0.004 | 0.001 | 1 | 0.002 |

*Note.* $\chi^2_{12}$ compares logistic models 1 and 2; $\chi^2_{13}$ compares logistic models 1 and 3; $\chi^2_{23}$ compares logistic models 2 and 3; $R^2$ = the difference between two generalized coefficients of determination (Cox & Snell, 1989)

Table 6

*Early versus Later Age: Differential Item Functioning Statistics and Effect Sizes*

| Item | | $\chi^2_{12}$ | *df* | $R^2_{12}$ | $\chi^2_{13}$ | *df* | $R^2_{13}$ | $\chi^2_{23}$ | *Df* | $R^2_{23}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| TMBS GP | 8 | 0.001 | 1 | 0.007 | 0.005 | 2 | 0.007 | 0.935 | 1 | 0.000 |
| TMBS M | 3 | 0.000 | 1 | 0.043 | 0.000 | 2 | 0.044 | 0.255 | 1 | 0.001 |
| | 7 | 0.002 | 1 | 0.006 | 0.000 | 2 | 0.023 | 0.000 | 1 | 0.017 |
| | 10 | 0.000 | 1 | 0.020 | 0.000 | 2 | 0.023 | 0.081 | 1 | 0.003 |
| | 5* | 0.000 | 1 | 0.008 | 0.001 | 2 | 0.008 | 0.942 | 1 | 0.000 |
| | 11* | 0.007 | 1 | 0.009 | 0.023 | 2 | 0.009 | 0.538 | 1 | 0.001 |
| TMBS PO | 2 | 0.000 | 1 | 0.016 | 0.000 | 2 | 0.022 | 0.017 | 1 | 0.006 |
| | 4 | 0.089 | 1 | 0.001 | 0.000 | 2 | 0.022 | 0.000 | 1 | 0.021 |
| | 7 | 0.000 | 1 | 0.016 | 0.000 | 2 | 0.030 | 0.000 | 1 | 0.014 |
| PCT | 3 | 0.369 | 1 | 0.001 | 0.000 | 2 | 0.042 | 0.000 | 1 | 0.041 |
| TMQ-SRP | 2 | 0.000 | 1 | 0.007 | 0.001 | 2 | 0.006 | 0.773 | 1 | 0.000 |
| | 4 | 0.000 | 1 | 0.007 | 0.001 | 2 | 0.007 | 0.510 | 1 | 0.000 |
| | 5 | 0.526 | 1 | 0.000 | 0.001 | 2 | 0.005 | 0.000 | 1 | 0.004 |
| | 6 | 0.000 | 1 | 0.021 | 0.000 | 2 | 0.022 | 0.432 | 1 | 0.001 |
| | 7 | 0.000 | 1 | 0.024 | 0.000 | 2 | 0.024 | 0.446 | 1 | 0.001 |
| TMQ-TA | 1 | 0.516 | 1 | 0.000 | 0.003 | 2 | 0.011 | 0.001 | 1 | 0.010 |
| TSQ-EO | 2 | 0.000 | 1 | 0.004 | 0.001 | 2 | 0.004 | 0.951 | 1 | 0.000 |
| | 3 | 0.012 | 1 | 0.002 | 0.000 | 2 | 0.004 | 0.001 | 1 | 0.002 |

*Note.* $\chi^2_{12}$ compares logistic models 1 and 2; $\chi^2_{13}$ compares logistic models 1 and 3; $\chi^2_{23}$ compares logistic models 2 and 3; $R^2$ = the difference between two generalized coefficients of determination (Cox & Snell, 1989)

*Items containing DIF after original DIF items were removed and analysis re-run

Table 7

*Temporal Awareness: Differential Item Functioning Statistics and Effect Sizes*

| Item | | $\chi^2_{12}$ | *df* | $R^2_{12}$ | $\chi^2_{13}$ | *df* | $R^2_{13}$ | $\chi^2_{23}$ | *Df* | $R^2_{23}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| TMBS GP | 3 | 0.003 | 1 | 0.005 | 0.006 | 2 | 0.006 | 0.225 | 1 | 0.001 |
| TMBS PO | 7 | 0.003 | 1 | 0.005 | 0.867 | 2 | 0.008 | 0.982 | 1 | 0.003 |
| TMQ-SRP | 4 | 0.000 | 1 | 0.004 | 0.000 | 2 | 0.005 | 0.038 | 1 | 0.001 |
| TSQ-EO | 2 | 0.000 | 1 | 0.004 | 0.001 | 2 | 0.004 | 0.951 | 1 | 0.000 |
| | 3 | 0.012 | 1 | 0.002 | 0.000 | 2 | 0.004 | 0.001 | 1 | 0.002 |

*Note.* $\chi^2_{12}$ compares logistic models 1 and 2; $\chi^2_{13}$ compares logistic models 1 and 3; $\chi^2_{23}$ compares logistic models 2 and 3; $R^2$ = the difference between two generalized coefficients of determination (Cox & Snell, 1989)

Table 8

*Fit statistics for subfactors of the time management measures*

| | $\chi^2$ | *df* | CFI | RMSEA | SRMR |
|---|---|---|---|---|---|
| TMBS GP | 668.65 | 35 | 0.85 | 0.120 | 0.06 |
| TMBS M | 558.09 | 44 | 0.86 | 0.097 | 0.06 |
| TMBS PO | 266.34 | 20 | 0.90 | 0.099 | 0.05 |
| PCT | 52.78 | 5 | 0.95 | 0.088 | 0.04 |
| TMQ SRP | 381.13 | 14 | 0.93 | 0.145 | 0.06 |
| TMQ TA | 167.65 | 5 | 0.78 | 0.162 | 0.07 |
| TSQ EO | 10.32 | 2 | 0.99 | 0.058 | 0.01 |
| TSQ SP | 25.30 | 5 | 0.99 | 0.057 | 0.02 |
| TSQ SR | 176.66 | 5 | 0.85 | 0.166 | 0.07 |
| TSQ PO | 0.00 | 0 | 1.00 | 0.000 | 0.00 |
| TSQ P | 0.00 | 0 | 1.00 | 0.000 | 0.00 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, SMSR = standardized root mean square residual, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 9

*Gender: CFA measurement equivalence test statistics*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| TMBS GP | | | | | | |
| Configural | 438.25 | 68 | | | 0.91 | |
| Metric | 452.29 | 77 | 14.04 | 0.121 | 0.91 | 0.00 |
| Scalar | 490.75 | 86 | 38.47 | 0.000 | 0.90 | 0.01 |
| Strict | 506.43 | 96 | 15.68 | 0.109 | 0.90 | 0.00 |
| Structural | 507.35 | 97 | 0.92 | 0.336 | 0.90 | 0.00 |
| TMBS M | | | | | | |
| Configural | 505.59 | 86 | | | 0.89 | |
| Metric | 519.25 | 96 | 13.66 | 0.189 | 0.88 | 0.00 |
| Scalar | 585.40 | 106 | 66.16 | 0.000 | 0.87 | 0.02 |
| Strict | 635.63 | 117 | 50.22 | 0.000 | 0.86 | 0.01 |
| Structural | 674.08 | 118 | 38.45 | 0.000 | 0.85 | 0.01 |
| TMBS PO | | | | | | |
| Configural | 297.41 | 40 | | | 0.89 | |
| Metric | 319.97 | 47 | 22.56 | 0.002 | 0.89 | 0.01 |
| Scalar | 330.02 | 54 | 10.05 | 0.186 | 0.89 | 0.00 |
| Strict | 339.97 | 62 | 9.95 | 0.269 | 0.89 | 0.00 |
| Structural | 359.88 | 63 | 19.90 | 0.000 | 0.88 | 0.01 |
| PCT | | | | | | |
| Configural | 58.66 | 10 | | | 0.95 | |
| Metric | 63.04 | 14 | 4.38 | 0.36 | 0.95 | 0.00 |
| Scalar | 70.41 | 18 | 7.37 | 0.12 | 0.95 | 0.00 |
| Strict | 78.05 | 23 | 7.64 | 0.18 | 0.95 | 0.00 |
| Structural | 78.25 | 24 | 0.21 | 0.65 | 0.95 | 0.00 |
| TMQ SRP | | | | | | |
| Configural | 405.59 | 28 | | | 0.92 | |
| Metric | 409.16 | 34 | 3.56 | 0.736 | 0.92 | 0.00 |
| Scalar | 457.71 | 40 | 48.55 | 0.000 | 0.92 | 0.01 |
| Strict | 479.01 | 47 | 21.30 | 0.003 | 0.91 | 0.00 |
| Structural | 500.80 | 48 | 21.79 | 0.000 | 0.91 | 0.00 |
| TMQ TA | | | | | | |
| Configural | 172.19 | 10 | | | 0.78 | |
| Metric | 178.97 | 14 | 6.78 | 0.147 | 0.78 | 0.00 |
| Scalar | 200.22 | 18 | 21.25 | 0.000 | 0.76 | 0.02 |
| Strict | 204.04 | 23 | 3.82 | 0.576 | 0.76 | 0.00 |
| Structural | 204.9 | 24 | 0.86 | 0.354 | 0.76 | 0.00 |
| TSQ EO | | | | | | |
| Configural | 11.54 | 4 | | | 1.00 | |
| Metric | 12.36 | 7 | 0.82 | 0.845 | 1.00 | 0.00 |
| Scalar | 25.20 | 10 | 12.84 | 0.005 | 0.99 | 0.01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Strict | 48.08 | 14 | 22.88 | 0.000 | 0.98 | 0.01 |
| Structural | 48.82 | 15 | 0.73 | 0.291 | 0.98 | 0.00 |
| TSQ SP | | | | | | |
| Configural | 31.17 | 10 | | | 0.99 | |
| Metric | 41.91 | 14 | 10.73 | 0.030 | 0.99 | 0.00 |
| Scalar | 51.37 | 18 | 9.46 | 0.051 | 0.98 | 0.00 |
| Strict | 76.93 | 23 | 25.56 | 0.000 | 0.98 | 0.01 |
| Structural | 78.35 | 24 | 1.42 | 0.233 | 0.97 | 0.00 |
| TSQ SR | | | | | | |
| Configural | 181.37 | 10 | | | 0.85 | |
| Metric | 186.2 | 14 | 4.83 | 0.305 | 0.85 | 0.00 |
| Scalar | 198.56 | 18 | 12.36 | 0.015 | 0.84 | 0.01 |
| Strict | 228.13 | 23 | 29.57 | 0.000 | 0.82 | 0.02 |
| Structural | 233.61 | 24 | 5.48 | 0.019 | 0.82 | 0.00 |
| TSQ PO | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 5.51 | 2 | 5.51 | 0.063 | 1.00 | 0.00 |
| Scalar | 8.68 | 4 | 3.17 | 0.205 | 0.99 | 0.00 |
| Strict | 15.00 | 7 | 6.32 | 0.097 | 0.99 | 0.00 |
| Structural | 15.01 | 8 | 0.00 | 0.944 | 0.99 | 0.00 |
| TSQ P | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 0.88 | 2 | 0.88 | 0.643 | 1.00 | 0.00 |
| Scalar | 12.34 | 4 | 11.45 | 0.003 | 0.99 | 0.01 |
| Strict | 21.47 | 7 | 9.13 | 0.028 | 0.98 | 0.01 |
| Structural | 23.01 | 8 | 1.54 | 0.215 | 0.98 | 0.00 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 10

*Early versus Middle Age: CFA measurement equivalence test statistics*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| TMBS GP | | | | | | |
| Configural | 389.13 | 68 | | | 0.90 | |
| Metric | 405.01 | 77 | 15.88 | 0.070 | 0.90 | 0.00 |
| Scalar | 428.75 | 86 | 23.74 | 0.005 | 0.90 | 0.00 |
| Strict | 447.34 | 96 | 18.59 | 0.050 | 0.90 | 0.00 |
| Structural | 449.18 | 97 | 1.84 | 0.175 | 0.90 | 0.00 |
| TMBS M | | | | | | |
| Configural | 291.09 | 86 | | | 0.90 | |
| Metric | 413.58 | 96 | 22.49 | 0.013 | 0.89 | 0.00 |
| Scalar | 435.88 | 106 | 22.30 | 0.014 | 0.89 | 0.00 |
| Strict | 458.19 | 117 | 22.31 | 0.022 | 0.89 | 0.00 |
| Structural | 460.52 | 118 | 2.33 | 0.127 | 0.88 | 0.00 |
| TMBS PO | | | | | | |
| Configural | 237.17 | 40 | | | 0.90 | |
| Metric | 254.97 | 47 | 17.80 | 0.012 | 0.90 | 0.01 |
| Scalar | 275.94 | 54 | 20.96 | 0.004 | 0.89 | 0.01 |
| Strict | 298.26 | 62 | 22.33 | 0.004 | 0.88 | 0.01 |
| Structural | 309.74 | 63 | 11.48 | 0.001 | 0.88 | 0.01 |
| PCT | | | | | | |
| Configural | 42.99 | 10 | | | 0.96 | |
| Metric | 53.39 | 14 | 10.41 | 0.034 | 0.95 | 0.01 |
| Scalar | 64.38 | 18 | 10.98 | 0.027 | 0.94 | 0.01 |
| Strict | 74.58 | 23 | 10.21 | 0.070 | 0.94 | 0.01 |
| Structural | 78.57 | 24 | 3.98 | 0.046 | 0.93 | 0.00 |
| TMQ SRP | | | | | | |
| Configural | 314.65 | 28 | | | 0.93 | |
| Metric | 324.90 | 34 | 10.25 | 0.012 | 0.93 | 0.00 |
| Scalar | 354.32 | 40 | 29.43 | 0.000 | 0.92 | 0.01 |
| Strict | 368.70 | 47 | 14.38 | 0.045 | 0.92 | 0.00 |
| Structural | 371.88 | 48 | 3.18 | 0.075 | 0.92 | 0.00 |
| TMQ TA | | | | | | |
| Configural | 127.62 | 10 | | | 0.79 | |
| Metric | 133.26 | 14 | 5.64 | 0.228 | 0.79 | 0.00 |
| Scalar | 137.69 | 18 | 4.43 | 0.351 | 0.79 | 0.00 |
| Strict | 148.40 | 23 | 10.71 | 0.057 | 0.78 | 0.01 |
| Structural | 151.97 | 24 | 3.57 | 0.059 | 0.77 | 0.01 |
| TSQ EO | | | | | | |
| Configural | 7.58 | 4 | | | 1.00 | |
| Metric | 14.70 | 7 | 7.12 | 0.068 | 0.99 | 0.00 |
| Scalar | 19.90 | 10 | 5.20 | 0.158 | 0.99 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Strict | 24.47 | 14 | 4.57 | 0.335 | 0.99 | 0.00 |
| Structural | 36.45 | 15 | 11.99 | 0.001 | 0.98 | 0.01 |
| TSQ SP | | | | | | |
| Configural | 40.55 | 10 | | | 0.98 | |
| Metric | 45.99 | 14 | 5.44 | 0.245 | 0.98 | 0.00 |
| Scalar | 49.99 | 18 | 3.71 | 0.446 | 0.98 | 0.00 |
| Strict | 124.16 | 23 | 74.46 | 0.000 | 0.94 | 0.04 |
| Structural | 139.25 | 24 | 15.09 | 0.000 | 0.93 | 0.01 |
| TSQ SR | | | | | | |
| Configural | 153.47 | 10 | | | 0.85 | |
| Metric | 161.11 | 14 | 7.63 | 0.106 | 0.84 | 0.00 |
| Scalar | 164.34 | 18 | 3.23 | 0.520 | 0.84 | 0.00 |
| Strict | 188.86 | 23 | 24.52 | 0.000 | 0.82 | 0.02 |
| Structural | 194.58 | 24 | 5.72 | 0.017 | 0.82 | 0.01 |
| TSQ PO | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 0.41 | 2 | 0.41 | 0.815 | 1.00 | 0.00 |
| Scalar | 0.63 | 4 | 0.22 | 0.894 | 1.00 | 0.00 |
| Strict | 14.71 | 7 | 14.98 | 0.003 | 0.99 | 0.02 |
| Structural | 21.82 | 8 | 21.82 | 0.000 | 0.94 | 0.04 |
| TSQ P | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 0.48 | 2 | 0.48 | 0.787 | 1.00 | 0.00 |
| Scalar | 8.59 | 4 | 8.11 | 0.017 | 0.99 | 0.01 |
| Strict | 64.76 | 7 | 56.17 | 0.000 | 0.92 | 0.07 |
| Structural | 71.79 | 8 | 7.03 | 0.008 | 0.91 | 0.01 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 11

*Middle versus Later Age: CFA measurement equivalence test statistics*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| TMBS GP | | | | | | |
| Configural | 283.95 | 68 | | | 0.92 | |
| Metric | 290.24 | 77 | 6.29 | 0.710 | 0.92 | 0.00 |
| Scalar | 304.84 | 86 | 14.61 | 0.102 | 0.92 | 0.00 |
| Strict | 320.18 | 96 | 15.34 | 0.120 | 0.91 | 0.00 |
| Structural | 323.88 | 97 | 3.70 | 0.055 | 0.91 | 0.00 |
| TMBS M | | | | | | |
| Configural | 314.78 | 86 | | | 0.91 | |
| Metric | 326.13 | 96 | 11.35 | 0.331 | 0.91 | 0.00 |
| Scalar | 372.26 | 106 | 46.13 | 0.000 | 0.89 | 0.02 |
| Strict | 379.75 | 117 | 7.49 | 0.759 | 0.89 | 0.00 |
| Structural | 379.75 | 118 | 0.00 | 0.971 | 0.89 | 0.00 |
| TMBS PO | | | | | | |
| Configural | 205.91 | 40 | | | 0.89 | |
| Metric | 231.02 | 47 | 25.11 | 0.001 | 0.88 | 0.01 |
| Scalar | 248.01 | 54 | 16.99 | 0.017 | 0.88 | 0.01 |
| Strict | 268.48 | 62 | 20.47 | 0.009 | 0.87 | 0.01 |
| Structural | 277.91 | 63 | 9.43 | 0.002 | 0.86 | 0.01 |
| PCT | | | | | | |
| Configural | 33.76 | 10 | | | 0.97 | |
| Metric | 41.43 | 14 | 7.67 | 0.104 | 0.96 | 0.01 |
| Scalar | 47.67 | 18 | 6.24 | 0.182 | 0.96 | 0.00 |
| Strict | 48.43 | 23 | 0.76 | 0.980 | 0.96 | 0.01 |
| Structural | 52.60 | 24 | 4.17 | 0.041 | 0.96 | 0.01 |
| TMQ SRP | | | | | | |
| Configural | 272.12 | 28 | | | 0.93 | |
| Metric | 273.22 | 34 | 1.1 | 0.982 | 0.93 | 0.00 |
| Scalar | 291.78 | 40 | 18.56 | 0.005 | 0.92 | 0.00 |
| Strict | 300.48 | 47 | 8.69 | 0.276 | 0.92 | 0.00 |
| Structural | 303.26 | 48 | 2.79 | 0.095 | 0.92 | 0.00 |
| TMQ TA | | | | | | |
| Configural | 118.62 | 10 | | | 0.80 | |
| Metric | 128.38 | 14 | 9.76 | 0.045 | 0.79 | 0.01 |
| Scalar | 135.33 | 18 | 6.95 | 0.139 | 0.78 | 0.01 |
| Strict | 148.44 | 23 | 13.11 | 0.022 | 0.77 | 0.02 |
| Structural | 154.61 | 24 | 6.18 | 0.013 | 0.76 | 0.01 |
| TSQ EO | | | | | | |
| Configural | 9.41 | 4 | | | 0.99 | |
| Metric | 18.31 | 7 | 8.90 | 0.031 | 0.99 | 0.01 |
| Scalar | 21.01 | 10 | 2.70 | 0.440 | 0.99 | 0.00 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Strict | 27.87 | 14 | 6.85 | 0.144 | 0.99 | 0.00 |
| Structural | 30.37 | 15 | 2.51 | 0.113 | 0.98 | 0.00 |
| TSQ SP | | | | | | |
| Configural | 10.91 | 10 | | | 1.00 | |
| Metric | 11.79 | 14 | 0.88 | 0.928 | 1.00 | 0.00 |
| Scalar | 17.83 | 18 | 6.04 | 0.196 | 1.00 | 0.00 |
| Strict | 30.76 | 23 | 12.92 | 0.024 | 0.99 | 0.01 |
| Structural | 39.94 | 24 | 9.18 | 0.002 | 0.99 | 0.01 |
| TSQ SR | | | | | | |
| Configural | 108.05 | 10 | | | 0.87 | |
| Metric | 115.46 | 14 | 7.41 | 0.116 | 0.86 | 0.01 |
| Scalar | 120.02 | 18 | 4.57 | 0.335 | 0.86 | 0.00 |
| Strict | 126.28 | 23 | 6.26 | 0.282 | 0.86 | 0.00 |
| Structural | 126.56 | 24 | 0.29 | 0.592 | 0.86 | 0.00 |
| TSQ PO | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 3.58 | 2 | 3.58 | 0.167 | 1.00 | 0.00 |
| Scalar | 5.29 | 4 | 1.71 | 0.426 | 1.00 | 0.00 |
| Strict | 23.38 | 7 | 18.10 | 0.000 | 0.96 | 0.04 |
| Structural | 27.78 | 8 | 4.39 | 0.036 | 0.95 | 0.01 |
| TSQ P | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 9.00 | 2 | 9.00 | 0.011 | 0.99 | 0.01 |
| Scalar | 16.06 | 4 | 7.05 | 0.029 | 0.98 | 0.01 |
| Strict | 25.53 | 7 | 9.47 | 0.024 | 0.97 | 0.01 |
| Structural | 33.90 | 8 | 8.37 | 0.004 | 0.96 | 0.01 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 12

*Early versus Later Age: CFA measurement equivalence test statistics*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| TMBS GP | | | | | | |
| Configural | 324.72 | 68 | | | 0.89 | |
| Metric | 333.72 | 77 | 9.00 | 0.437 | 0.89 | 0.00 |
| Scalar | 364.19 | 86 | 30.47 | 0.000 | 0.88 | 0.01 |
| Strict | 386.46 | 96 | 22.26 | 0.014 | 0.88 | 0.01 |
| Structural | 387.03 | 97 | 0.57 | 0.449 | 0.88 | 0.00 |
| TMBS M | | | | | | |
| Configural | 332.85 | 86 | | | 0.89 | |
| Metric | 354.16 | 96 | 21.31 | 0.019 | 0.88 | 0.01 |
| Scalar | 429.09 | 106 | 74.93 | 0.000 | 0.85 | 0.03 |
| Strict | 445.04 | 117 | 15.95 | 0.143 | 0.85 | 0.00 |
| Structural | 446.05 | 118 | 1.01 | 0.315 | 0.85 | 0.00 |
| TMBS PO | | | | | | |
| Configural | 202.91 | 40 | | | 0.88 | |
| Metric | 246.05 | 47 | 43.14 | 0.000 | 0.85 | 0.03 |
| Scalar | 279.36 | 54 | 33.31 | 0.000 | 0.83 | 0.02 |
| Strict | 326.88 | 62 | 47.52 | 0.000 | 0.80 | 0.03 |
| Structural | 365.90 | 63 | 39.02 | 0.000 | 0.77 | 0.03 |
| PCT | | | | | | |
| Configural | 46.33 | 10 | | | 0.93 | |
| Metric | 68.11 | 14 | 21.78 | 0.000 | 0.90 | 0.03 |
| Scalar | 72.93 | 18 | 4.82 | 0.307 | 0.90 | 0.00 |
| Strict | 80.45 | 23 | 7.52 | 0.185 | 0.89 | 0.01 |
| Structural | 93.64 | 24 | 13.20 | 0.000 | 0.87 | 0.02 |
| TMQ SRP | | | | | | |
| Configural | 221.11 | 28 | | | 0.93 | |
| Metric | 229.56 | 34 | 8.46 | 0.206 | 0.93 | 0.00 |
| Scalar | 295.42 | 40 | 65.86 | 0.000 | 0.91 | 0.02 |
| Strict | 307.12 | 47 | 11.70 | 0.111 | 0.91 | 0.00 |
| Structural | 307.25 | 48 | 0.13 | 0.715 | 0.91 | 0.00 |
| TMQ TA | | | | | | |
| Configural | 105.63 | 10 | | | 0.77 | |
| Metric | 123.06 | 14 | 17.43 | 0.002 | 0.74 | 0.03 |
| Scalar | 131.56 | 18 | 8.50 | 0.075 | 0.73 | 0.01 |
| Strict | 147.92 | 23 | 16.36 | 0.006 | 0.71 | 0.03 |
| Structural | 162.52 | 24 | 14.61 | 0.000 | 0.67 | 0.03 |
| TSQ EO | | | | | | |
| Configural | 11.20 | 4 | | | 0.99 | |
| Metric | 15.38 | 7 | 4.18 | 0.242 | 0.99 | 0.00 |
| Scalar | 26.81 | 10 | 11.42 | 0.010 | 0.98 | 0.01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Strict | 36.90 | 14 | 10.09 | 0.039 | 0.98 | 0.01 |
| Structural | 54.83 | 15 | 17.94 | 0.000 | 0.96 | 0.02 |
| TSQ SP | | | | | | |
| Configural | 43.06 | 10 | | | 0.97 | |
| Metric | 47.40 | 14 | 4.35 | 0.361 | 0.97 | 0.00 |
| Scalar | 57.57 | 18 | 10.17 | 0.038 | 0.97 | 0.01 |
| Strict | 121.97 | 23 | 64.40 | 0.000 | 0.92 | 0.05 |
| Structural | 157.60 | 24 | 35.63 | 0.000 | 0.89 | 0.03 |
| TSQ SR | | | | | | |
| Configural | 122.17 | 10 | | | 0.83 | |
| Metric | 127.59 | 14 | 5.41 | 0.247 | 0.82 | 0.00 |
| Scalar | 132.86 | 18 | 5.27 | 0.261 | 0.82 | 0.00 |
| Strict | 150.88 | 23 | 18.02 | 0.003 | 0.80 | 0.02 |
| Structural | 156.35 | 24 | 5.47 | 0.019 | 0.79 | 0.01 |
| TSQ PO | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 2.21 | 2 | 2.21 | 0.331 | 1.00 | 0.00 |
| Scalar | 2.53 | 4 | 0.32 | 0.853 | 1.00 | 0.00 |
| Strict | 9.36 | 7 | 6.83 | 0.078 | 0.99 | 0.01 |
| Structural | 40.35 | 8 | 31.00 | 0.000 | 0.91 | 0.09 |
| TSQ P | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 8.51 | 2 | 8.51 | 0.014 | 0.99 | 0.01 |
| Scalar | 19.08 | 4 | 10.57 | 0.005 | 0.97 | 0.02 |
| Strict | 50.39 | 7 | 31.31 | 0.000 | 0.92 | 0.06 |
| Structural | 71.79 | 8 | 21.41 | 0.000 | 0.88 | 0.04 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 13

*Temporal Awareness: CFA measurement equivalence test statistics*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| TMBS GP | | | | | | |
| Configural | 448.50 | 68 | | | 0.91 | |
| Metric | 457.95 | 77 | 9.45 | 0.397 | 0.91 | 0.00 |
| Scalar | 488.91 | 86 | 30.95 | 0.000 | 0.90 | 0.01 |
| Strict | 494.47 | 96 | 5.57 | 0.850 | 0.90 | 0.00 |
| Structural | 495.52 | 97 | 1.05 | 0.305 | 0.90 | 0.00 |
| TMBS M | | | | | | |
| Configural | 505.59 | 86 | | | 0.89 | |
| Metric | 510.45 | 96 | 4.85 | 0.901 | 0.89 | 0.00 |
| Scalar | 525.82 | 106 | 15.37 | 0.119 | 0.89 | 0.00 |
| Strict | 532.03 | 117 | 6.22 | 0.859 | 0.89 | 0.00 |
| Structural | 532.34 | 118 | 0.31 | 0.580 | 0.89 | 0.00 |
| TMBS PO | | | | | | |
| Configural | 293.47 | 40 | | | 0.90 | |
| Metric | 307.63 | 47 | 14.16 | 0.048 | 0.89 | 0.00 |
| Scalar | 323.18 | 54 | 15.55 | 0.030 | 0.89 | 0.00 |
| Strict | 346.42 | 62 | 23.24 | 0.003 | 0.88 | 0.01 |
| Structural | 265.10 | 63 | 18.68 | 0.000 | 0.88 | 0.01 |
| PCT | | | | | | |
| Configural | 64.40 | 10 | | | 0.95 | |
| Metric | 66.10 | 14 | 1.70 | 0.792 | 0.95 | 0.00 |
| Scalar | 70.57 | 18 | 4.47 | 0.346 | 0.95 | 0.00 |
| Strict | 76.59 | 23 | 6.02 | 0.304 | 0.95 | 0.00 |
| Structural | 77.35 | 24 | 0.76 | 0.383 | 0.95 | 0.00 |
| TMQ SRP | | | | | | |
| Configural | 394.06 | 28 | | | 0.93 | |
| Metric | 404.11 | 34 | 10.05 | 0.122 | 0.93 | 0.00 |
| Scalar | 424.55 | 40 | 20.44 | 0.002 | 0.92 | 0.00 |
| Strict | 430.74 | 47 | 6.18 | 0.518 | 0.92 | 0.00 |
| Structural | 431.69 | 48 | 0.95 | 0.330 | 0.92 | 0.00 |
| TMQ TA | | | | | | |
| Configural | 83.57 | 8 | | | 0.90 | |
| Metric | 87.14 | 12 | 3.57 | 0.468 | 0.90 | 0.00 |
| Scalar | 98.76 | 16 | 11.61 | 0.020 | 0.89 | 0.01 |
| Strict | 105.48 | 21 | 6.72 | 0.242 | 0.89 | 0.00 |
| Structural | 105.98 | 22 | 0.51 | 0.477 | 0.89 | 0.00 |
| TSQ EO | | | | | | |
| Configural | 10.83 | 4 | | | 1.00 | |
| Metric | 23.86 | 7 | 13.02 | 0.005 | 0.99 | 0.01 |
| Scalar | 34.51 | 10 | 10.66 | 0.014 | 0.99 | 0.01 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Strict | 40.83 | 14 | 6.31 | 0.177 | 0.98 | 0.00 |
| Structural | 42.72 | 15 | 1.90 | 0.169 | 0.98 | 0.00 |
| TSQ SP | | | | | | |
| Configural | 28.10 | 10 | | | 0.99 | |
| Metric | 34.53 | 14 | 6.44 | 0.169 | 0.99 | 0.00 |
| Scalar | 37.08 | 18 | 2.55 | 0.636 | 0.99 | 0.00 |
| Strict | 44.22 | 23 | 7.14 | 0.210 | 0.99 | 0.00 |
| Structural | 46.26 | 24 | 2.04 | 0.153 | 0.99 | 0.00 |
| TSQ SR | | | | | | |
| Configural | 174.69 | 10 | | | 0.86 | |
| Metric | 183.71 | 14 | 9.02 | 0.061 | 0.85 | 0.00 |
| Scalar | 190.74 | 18 | 7.03 | 0.134 | 0.85 | 0.00 |
| Strict | 218.54 | 23 | 27.81 | 0.000 | 0.83 | 0.02 |
| Structural | 218.86 | 24 | 0.32 | 0.571 | 0.83 | 0.00 |
| TSQ PO | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 1.92 | 2 | 1.92 | 0.382 | 1.00 | 0.00 |
| Scalar | 3.30 | 4 | 1.38 | 0.501 | 1.00 | 0.00 |
| Strict | 22.90 | 7 | 19.59 | 0.000 | 0.98 | 0.02 |
| Structural | 23.36 | 8 | 0.46 | 0.498 | 0.98 | 0.00 |
| TSQ P | | | | | | |
| Configural | 0.00 | 0 | | | 1.00 | |
| Metric | 6.44 | 2 | 6.44 | 0.040 | 1.00 | 0.01 |
| Scalar | 11.60 | 4 | 5.17 | 0.075 | 0.99 | 0.00 |
| Strict | 41.53 | 7 | 29.92 | 0.000 | 0.96 | 0.03 |
| Structural | 46.48 | 8 | 4.95 | 0.026 | 0.96 | 0.00 |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 14

*Gender: Indepentent samples t-test*

| | Male | | Female | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *df* | *T* | *p* | *d* |
| TMBS GP | 3.66 | 0.67 | 3.70 | 0.65 | 1239 | -1.11 | 0.269 | -0.06 |
| TMBS M | 2.95 | 0.89 | 3.22 | 0.89 | 1239 | -5.33 | 0.000 | -0.30 |
| TMBS PO | 3.71 | 0.74 | 3.90 | 0.76 | 1239 | -5.33 | 0.000 | -0.25 |
| PCT | 3.44 | 0.75 | 3.43 | 0.82 | 1239 | 0.34 | 0.735 | -0.11 |
| TMQ SRP | 2.92 | 0.98 | 3.18 | 0.96 | 1239 | -4.87 | 0.000 | -0.27 |
| TMQ TA | 3.11 | 0.59 | 3.03 | 0.62 | 1239 | 2.48 | 0.013 | 0.13 |

*Note.* N = 1,241; TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes

Table 15

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the goal setting and prioritization subfactor of the TMBS*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Age category | 1 | 5.543 | 0.004 | 0.009 |
| Conscientiousness | 1 | 153.396 | 0.000 | 0.111 |
| Job complexity | 1 | 3.408 | 0.000 | 0.067 |
| Tenure at job | 1 | 3.408 | 0.065 | 0.003 |
| Career stage: exploration | 1 | 0.908 | 0.341 | 0.001 |
| Career stage: establishment | 1 | 1.282 | 0.258 | 0.001 |
| Career stage: maintenance | 1 | 3.67 | 0.056 | 0.003 |
| Career stage: decline | 1 | 2.061 | 0.151 | 0.002 |
| Prospective memory | 1 | 1.937 | 0.164 | 0.002 |

*Note.* N = 1244, TMBS = Time Management Behavior Scale

Table 16

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the goal setting and prioritizing subfactor of the TMBS: Planned Contrasts between Age Category*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Later vs Early | 1 | 3.71 | 0.054 | 0.003 |
| Later vs Middle | 1 | 0.431 | 0.512 | 0.000 |
| Middle vs Early | 1 | 10.981 | 0.001 | 0.009 |

*Note.* N = 1244, TMBS = Time Management Behavior Scale, Significance assessed at 0.017 (0.05/3)

Table 17

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the mechanics subfactor of the TMBS*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Age category | 1 | 2.239 | 0.107 | 0.004 |
| Conscientiousness | 1 | 89.813 | 0.000 | 0.068 |
| Job complexity | 1 | 79.200 | 0.000 | 0.060 |
| Tenure at job | 1 | 1.192 | 0.275 | 0.001 |
| Career stage: exploration | 1 | 1.658 | 0.198 | 0.001 |
| Career stage: establishment | 1 | 0.110 | 0.740 | 0.000 |
| Career stage: maintenance | 1 | 8.962 | 0.003 | 0.007 |
| Career stage: decline | 1 | 1.911 | 0.167 | 0.002 |
| Prospective memory | 1 | 20.573 | 0.000 | 0.016 |

*Note.* N = 1244, TMBS = Time Management Behavior Scale

Table 18

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the short-range planning subfactor of the TMQ*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Age category | 1 | 3.526 | 0.03 | 0.006 |
| Conscientiousness | 1 | 81.325 | 0.000 | 0.062 |
| Job complexity | 1 | 77.869 | 0.000 | 0.059 |
| Tenure at job | 1 | 2.297 | 0.130 | 0.002 |
| Career stage: exploration | 1 | 0.559 | 0.455 | 0 |
| Career stage: establishment | 1 | 1.743 | 0.187 | 0.001 |
| Career stage: maintenance | 1 | 1.330 | 0.249 | 0.001 |
| Career stage: decline | 1 | 1.082 | 0.299 | 0.001 |
| Prospective memory | 1 | 11.679 | 0.001 | 0.009 |

*Note.* N = 1244, TMQ = Time Management Questionnaire

Table 19

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the short-range planning subfactor of the TMQ: Planned Contrasts between Age Category*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Later vs Early | 1 | 3.177 | 0.075 | 0.003 |
| Later vs Middle | 1 | 0.045 | 0.833 | 0.000 |
| Middle vs Early | 1 | 6.729 | 0.01 | 0.005 |

*Note.* N = 1244, TMQ = Time Management Questionnaire, Significance assessed at 0.017 (0.05/3)

Table 20

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the effective organization subfactor of the TSQ*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Age category | 1 | 0.271 | 0.762 | 0.000 |
| Conscientiousness | 1 | 168.122 | 0.000 | 0.120 |
| Job complexity | 1 | 6.145 | 0.013 | 0.005 |
| Tenure at job | 1 | 1.663 | 0.197 | 0.001 |
| Career stage: exploration | 1 | 9.410 | 0.002 | 0.008 |
| Career stage: establishment | 1 | 0.062 | 0.803 | 0.000 |
| Career stage: maintenance | 1 | 0.086 | 0.770 | 0.000 |
| Career stage: decline | 1 | 2.010 | 0.157 | 0.002 |
| Prospective memory | 1 | 345.203 | 0.000 | 0.219 |

*Note.* N = 1244, TSQ = Time Structure Questionnaire

Table 21

*Analysis of Covariance (ANCOVA) with age category as dependent variable for the structured routine subfactor of the TSQ*

| | *df* | *F* | *p* | $\eta^2_{partial}$ |
|---|---|---|---|---|
| Age category | 1 | 0.7 | 0.497 | 0.001 |
| Conscientiousness | 1 | 142.654 | 0.000 | 0.011 |
| Job complexity | 1 | 63.356 | 0.000 | 0.049 |
| Tenure at job | 1 | 0.996 | 0.318 | 0.001 |
| Career stage: exploration | 1 | 0.677 | 0.411 | 0.001 |
| Career stage: establishment | 1 | 2.353 | 0.125 | 0.002 |
| Career stage: maintenance | 1 | 10.834 | 0.001 | 0.009 |
| Career stage: decline | 1 | 1.573 | 0.21 | 0.001 |
| Prospective memory | 1 | 14.275 | 0.000 | 0.011 |

*Note.* N = 1244, TSQ = Time Structure Questionnaire

Table 22

*Temporal Awareness: Indepentent samples t-test*

| | Low | | High | | | | | |
|---|---|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | *df* | *T* | *p* | *d* |
| TMBS GP | 3.54 | 0.68 | 3.60 | 0.67 | 1245 | -1.20 | 0.229 | -0.09 |
| TMBS M | 3.01 | 0.80 | 2.98 | 0.78 | 1245 | 0.64 | 0.523 | 0.04 |
| TMBS PO | 4.01 | 0.74 | 3.79 | 0.82 | 497.96 | 4.38 | 0.000 | 0.27 |
| PCT | 3.47 | 0.78 | 3.42 | 0.79 | 1245 | 0.91 | 0.365 | 0.06 |
| TMQ SRP | 3.19 | 0.80 | 3.13 | 0.81 | 1245 | 0.57 | 0.271 | 0.07 |
| TMQ TA | 3.19 | 0.56 | 3.15 | 0.58 | 1245 | 1.06 | 0.291 | 0.13 |
| TSQ SP | 3.97 | 1.08 | 4.09 | 1.08 | 1245 | -1.56 | 0.119 | -0.11 |
| TSQ SR | 3.00 | 0.90 | 3.00 | 0.87 | 1245 | 0.06 | 0.955 | 0.00 |

*Note.* N = 1,247; TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ SP = Sense of Purpose, TSQ SR = Structured Routine

Table 23

*Item Parameters for GGUM model*

| | α | δ | τ1 | τ2 | τ3 | τ4 |
|---|---|---|---|---|---|---|
| TMBS1GP | 1.11 | 0.12 | 2.66 | 1.61 | 1.53 | -0.08 |
| TMBS2GP | 1.19 | 0.08 | 2.31 | 1.36 | 1.26 | -0.06 |
| TMBS3GP | 1.25 | 0.42 | 2.81 | 1.74 | 1.63 | 0.29 |
| TMBS4GP | 1.14 | 0.27 | 2.52 | 1.69 | 1.57 | 0.12 |
| TMBS5GP | 1.22 | 0.08 | 2.29 | 1.37 | 1.34 | 0.03 |
| TMBS6GP | 0.94 | 0.08 | 2.53 | 1.68 | 1.67 | 0.28 |
| TMBS7GP | 0.62 | -0.01 | 3.94 | 1.54 | 1.83 | 0.17 |
| TMBS8GP | 1.81 | -0.22 | 1.50 | 0.87 | 0.49 | -0.19 |
| TMBS9GP | 1.82 | -0.18 | 1.68 | 1.03 | 0.78 | -0.14 |
| TMBS10GP | 1.09 | -0.02 | 2.20 | 1.43 | 1.32 | -0.18 |
| | | | | | | |
| TMBS1M | 1.07 | -0.32 | 1.30 | 0.86 | 1.07 | 0.23 |
| TMBS2M | 0.63 | -0.10 | 2.10 | 0.74 | 0.80 | -0.81 |
| TMBS3M | 0.43 | 0.06 | 0.71 | 0.70 | 1.27 | -1.06 |
| TMBS4M | 0.59 | 0.05 | 1.89 | 1.16 | 1.02 | -0.71 |
| TMBS5M | 2.02 | -0.55 | 2.15 | 1.35 | 1.26 | 0.51 |
| TMBS6M | 1.42 | -0.33 | 1.42 | 0.96 | 0.82 | 0.21 |
| TMBS7M | 0.80 | -0.21 | 0.81 | 0.97 | 1.01 | 0.41 |
| TMBS8M | 1.02 | -0.10 | 0.51 | 0.24 | 0.51 | -0.33 |
| TMBS9M | 0.00 | 0.97 | 1.40 | 1.04 | 0.82 | 0.64 |
| TMBS10M | 0.39 | -0.05 | 2.54 | 1.31 | 1.85 | -0.63 |
| TMBS11M | 0.34 | 0.16 | 2.54 | 1.31 | 1.21 | -1.45 |
| | | | | | | |
| TMBS1PO | 0.44 | 3.04 | 6.28 | 3.66 | 3.36 | 2.75 |
| TMBS2PO | 0.25 | 4.39 | 9.14 | 4.89 | 5.28 | 4.07 |
| TMBS3PO | 0.90 | 2.00 | 4.39 | 2.95 | 2.59 | 2.93 |
| TMBS4PO | 0.80 | 2.47 | 4.29 | 3.38 | 2.91 | 2.47 |
| TMBS5PO | 0.43 | 3.24 | 5.89 | 4.31 | 4.42 | 3.22 |
| TMBS6PO | 0.42 | 3.15 | 6.39 | 4.33 | 4.48 | 2.79 |
| TMBS7PO | 0.25 | 3.84 | 4.96 | 4.72 | 4.60 | 2.10 |
| TMBS8PO | 0.45 | 2.88 | 6.11 | 4.27 | 4.37 | 3.63 |
| | | | | | | |
| TMBS1PCT | 0.56 | -0.21 | 2.42 | 0.93 | 1.11 | -0.34 |
| TMBS2PCT | 0.88 | 0.09 | 2.47 | 1.41 | 1.13 | 0.31 |
| TMBS3PCT | 0.59 | 0.09 | 2.22 | 1.66 | 1.17 | -0.95 |
| TMBS4PCT | 0.80 | -0.20 | 2.92 | 1.31 | 1.37 | 0.07 |
| TMBS5PCT | 0.97 | -0.31 | 1.99 | 0.81 | 0.80 | 0.07 |
| | | | | | | |
| TMQ1SRP | 1.35 | -2.93 | 4.40 | 3.38 | 2.67 | 1.26 |
| TMQ2SRP | 1.52 | -2.88 | 4.64 | 3.74 | 2.71 | 1.22 |

| | | | | | | |
|---|---|---|---|---|---|---|
| TMQ3SRP | 1.59 | -2.88 | 4.38 | 3.56 | 2.72 | 1.41 |
| TMQ4SRP | 0.00 | 2.87 | 3.61 | 1.21 | 1.30 | -1.70 |
| TMQ5SRP | 1.47 | -3.76 | 5.45 | 4.17 | 3.42 | 1.98 |
| TMQ6SRP | 0.60 | -3.61 | 6.26 | 5.19 | 4.07 | 1.34 |
| TMQ7SRP | 0.41 | -4.83 | 7.59 | 7.18 | 5.41 | 2.23 |
| | | | | | | |
| TMQ1TA | 0.49 | 0.32 | 2.73 | 2.08 | 0.56 | -0.82 |
| TMQ2TA | 0.94 | -0.18 | 2.78 | 1.79 | 0.87 | -0.65 |
| TMQ3TA | 0.51 | 0.73 | 1.34 | 1.02 | -1.51 | -1.73 |
| TMQ4TA | 1.32 | 0.03 | 2.95 | 2.08 | 0.90 | -0.48 |
| TMQ5TA | 0.88 | 0.38 | 2.90 | 1.76 | 0.61 | -0.76 |
| | | | | | | |
| TSQ1EO | 1.13 | 0.00 | 1.88 | 1.15 | -0.29 | -1.10 |
| TSQ2EO | 1.85 | 0.00 | 1.49 | 0.87 | -0.07 | -0.71 |
| TSQ3EO | 1.93 | 0.00 | 1.57 | 0.98 | 0.16 | -0.25 |
| TSQ4EO | 2.47 | 0.00 | 1.47 | 0.88 | 0.09 | -0.48 |
| | | | | | | |
| TSQ1SR | 0.01 | 54.77 | 193.63 | 10.54 | -65.71 | -56.23 |
| TSQ2SR | 0.98 | -0.83 | 3.27 | 0.99 | -0.56 | -0.57 |
| TSQ3SR | 1.17 | -0.77 | 3.31 | 1.06 | -0.15 | -0.35 |
| TSQ4SR | 0.32 | -4.13 | 5.77 | 5.37 | 3.15 | 2.91 |
| TSQ5SR | 0.72 | -1.26 | 2.88 | 1.90 | 0.61 | 0.15 |
| | | | | | | |
| TSQ1SP | 0.00 | -3.17 | 2.10 | 1.36 | -0.48 | -0.25 |
| TSQ2SP | 1.23 | 3.44 | 4.69 | 4.09 | 2.43 | 0.71 |
| TSQ3SP | 0.66 | 3.70 | 5.59 | 5.15 | 2.79 | 0.76 |
| TSQ4SP | 0.58 | 6.16 | 8.82 | 5.81 | 3.53 | 2.95 |
| TSQ5SP | 2.15 | 3.63 | 4.70 | 3.93 | 2.67 | 1.25 |
| | | | | | | |
| TSQ1PO | 1.15 | -2.86 | 4.91 | 4.18 | 2.50 | 1.02 |
| TSQ2PO | 0.42 | -3.60 | 5.69 | 5.11 | 2.33 | -0.13 |
| TSQ3PO | 1.42 | -2.94 | 5.38 | 4.83 | 2.98 | 1.18 |
| | | | | | | |
| TSQ1P | 1.20 | 5.40 | 7.07 | 4.58 | 3.06 | 2.37 |
| TSQ2P | 2.12 | 1.09 | 1.97 | 1.04 | -0.02 | -0.35 |
| TSQ3P | 1.79 | 1.06 | 2.46 | 1.37 | 0.13 | -0.60 |

*Note.* TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

Table 24

*Fit statistics for proposed subfactors of a new time management measure.*

| | *Initial Model Fit* | | | | | *Model Fit with Modifications* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $\chi^2$ | *df* | CFI | RMSEA | SRMR | $\chi^2$ | *df* | CFI | RMSEA | SRMR |
| Assessment | 281.38 | 14 | 0.83 | 0.124 | 0.07 | 85.99 | 12 | 0.95 | 0.070 | 0.05 |
| Planning | 1186.69 | 44 | 0.75 | 0.144 | 0.08 | 434.49 | 43 | 0.92 | 0.085 | 0.05 |
| Monitoring | 259.17 | 20 | 0.85 | 0.098 | 0.06 | 166.77 | 19 | 0.91 | 0.079 | 0.05 |
| Control | 102.66 | 14 | 0.94 | 0.071 | 0.04 | NA | NA | NA | NA | NA |

*Note.* CFI = comparative fit index, RMSEA = root mean square error of approximation, SMSR = standardized root mean square residual, Assessment = Assessment of time behaviors, Planning = Planning behaviors, Monitoring = Monitoring behaviors, Control = Sense of control over time

Table 25

*CFA measurement equivalence test statistics for proposed monitoring subfactor of a new time management scale*

| | $\chi^2$ | *df* | $\Delta\chi^2$ | *p* | CFI | Δ CFI |
|---|---|---|---|---|---|---|
| Gender | | | | | | |
| Configural | 200.56 | 38 | | | 0.90 | |
| Metric | 203.87 | 45 | 14.04 | 0.121 | 0.90 | 0.00 |
| Scalar | 218.01 | 52 | 38.47 | 0.000 | 0.90 | 0.00 |
| Strict | 225.05 | 60 | 15.68 | 0.109 | 0.90 | 0.00 |
| Structural | 227.06 | 61 | 0.92 | 0.336 | 0.90 | 0.00 |
| Early vs. Middle | | | | | | |
| Configural | 170.38 | 38 | | | 0.90 | |
| Metric | 177.30 | 45 | 6.93 | 0.437 | 0.90 | 0.00 |
| Scalar | 186.53 | 52 | 9.22 | 0.237 | 0.89 | 0.00 |
| Strict | 199.66 | 60 | 13.14 | 0.107 | 0.89 | 0.00 |
| Structural | 205.50 | 61 | 5.84 | 0.016 | 0.89 | 0.00 |
| Middle vs. Later | | | | | | |
| Configural | 114.25 | 38 | | | 0.92 | |
| Metric | 123.47 | 45 | 9.23 | 0.237 | 0.92 | 0.00 |
| Scalar | 145.87 | 52 | 22.40 | 0.002 | 0.90 | 0.02 |
| Strict | 170.93 | 60 | 25.05 | 0.002 | 0.88 | 0.02 |
| Structural | 172.01 | 61 | 1.09 | 0.298 | 0.88 | 0.00 |
| Early vs. Later | | | | | | |
| Configural | 114.57 | 38 | | | 0.92 | |
| Metric | 118.45 | 45 | 3.89 | 0.793 | 0.93 | 0.00 |
| Scalar | 146.45 | 52 | 28.00 | 0.000 | 0.90 | 0.02 |
| Strict | 175.97 | 60 | 29.52 | 0.000 | 0.88 | 0.02 |
| Structural | 183.60 | 61 | 7.63 | 0.006 | 0.87 | 0.01 |

Note: CFI = comparative fit index, RMSEA = root mean square error of approximation

Table 26

*Item-level fit (GRM) for proposed time management scale*

| Item | $\chi^2$ | *df* | $\chi^2/df$ | RMSEA |
|---|---|---|---|---|
| Assess | | | | |
| TMBS M 11 | 67.65 | 35 | 1.93 | 0.027 |
| TMBS PO 1 | 40.36 | 34 | 1.19 | 0.012 |
| TMBS PO 5 | 51.38 | 30 | 1.71 | 0.024 |
| TMBS PO 6 | 55.20 | 30 | 1.84 | 0.026 |
| TSQ EO 1 | 78.63 | 21 | 3.74 | 0.047 |
| TSQ EO 12 | 109.96 | 23 | 4.78 | 0.055 |
| TSQ EO 13 | 158.77 | 18 | 8.82 | 0.079 |
| Plan | | | | |
| TMBS GP 1 | 37.88 | 24 | 1.58 | 0.022 |
| TMBS GP 2 | 53.39 | 27 | 1.98 | 0.028 |
| TMBS GP 3 | 46.81 | 26 | 1.80 | 0.025 |
| TMBS GP 4 | 67.70 | 24 | 2.82 | 0.038 |
| TMBS GP 5 | 54.22 | 24 | 2.26 | 0.032 |
| TMBS GP 6 | 77.94 | 26 | 3.00 | 0.040 |
| TMBS GP 7 | 29.71 | 26 | 1.14 | 0.011 |
| TMBS GP 9 | 59.23 | 30 | 1.97 | 0.028 |
| TMBS GP 10 | 50.22 | 27 | 1.86 | 0.026 |
| TMQ SRP 1 | 66.53 | 33 | 2.02 | 0.029 |
| TMQ SRP 3 | 75.28 | 32 | 2.35 | 0.033 |
| Monitor | | | | |
| TSQ 2 | 47.87 | 29 | 1.65 | 0.023 |
| TSQ 6 | 49.29 | 33 | 1.49 | 0.020 |
| TSQ 10 | 62.29 | 28 | 2.22 | 0.031 |
| TSQ SR 16 | 117.17 | 44 | 2.66 | 0.037 |
| TSQ 17 | 94.12 | 22 | 4.28 | 0.051 |
| TSQ 20 SR | 120.76 | 33 | 3.66 | 0.046 |
| TSQ 21 | 143.69 | 52 | 2.76 | 0.038 |
| TSQ 22 | 93.75 | 37 | 2.53 | 0.035 |
| Control | | | | |
| PCT 1 | 83.14 | 33 | 2.52 | 0.035 |
| PCT 2 | 69.79 | 31 | 2.25 | 0.032 |
| PCT 4 | 89.49 | 28 | 3.20 | 0.042 |
| PCT 5 | 129.85 | 30 | 4.33 | 0.052 |
| TMQ 2 TA | 58.54 | 31 | 1.89 | 0.027 |
| TMQ 3 TA | 58.30 | 27 | 2.16 | 0.031 |
| TMQ 5 TA | 72.73 | 25 | 2.91 | 0.039 |

*Note.* RMSEA = root mean square error of approximation, Assess = Assessment of time behaviors, Plan = Planning behaviors, Monitor = Monitoring behaviors, Control = Sense of control over time, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SR = Structure Routine

Table 27

*Time Management Measures - Items Removed during Testing*

| Item Number | Item Content | Method of Testing | | | | | |
|---|---|---|---|---|---|---|---|
| | | Internal Consistency | ME Gender | ME Early vs. Middle Age | ME Middle vs. LaterAge | ME Early vs. Later Age | ME Temporal |
| TMBS1GP | When I decide on what I will try to accomplish in the short term, I keep in mind my long-term objectives. | | | | | | |
| TMBS2GP | I review my goals to determine if they need revising. | | | | | | |
| TMBS3GP | I break complex, difficult projects down into smaller manageable tasks. | | | | | | |
| TMBS4GP | I set short-term goals for what I want to accomplish in a few days or weeks. | | | | | | |
| TMBS5GP | I set deadlines for myself when I set out to accomplish a task. | | | | | | |
| TMBS6GP | I look for ways to increase the efficiency with which I perform my daily activities. | | | | | | |
| TMBS7GP | I finish top priority tasks before going on to less important ones. | | | | | | |
| TMBS8GP | I review my daily activities to see where I am wasting time. | | x | | | | |
| TMBS9GP | During a typical day I evaluate how well I am following the schedule I have set down for myself. | | | | | | |
| TMBS10GP | I set priorities to determine the order in which I will perform tasks each day. | | | | | | |

*Note.* ME = Measurement Equivalence, Temporal = Temporal Awareness,TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ LRP = Long-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SP = Sense of Purpose, TSQ SR = Structure Routine, TSQ PO = Present Orientation, TSQ P = Persistence

| Item Number | Item Content | Method of Testing | | | | | |
|---|---|---|---|---|---|---|---|
| | | Internal Consistency | ME Gender | ME Early vs. Middle Age | ME Middle vs. LaterAge | ME Early vs. Later Age | ME Temporal |
| TMBS1M | I carry a notebook or use my phone to jot down notes and ideas. | | | | x | x | |
| TMBS2M | I schedule activities at least a week in advance. | | | | | x | |
| TMBS3M | When I find that I am frequently contacting someone, I record that person's name, address, and phone number in a special file. | | x | | x | x | |
| TMBS4M | I block out time in my daily schedule for regularly scheduled events. | | x | | | | |
| TMBS5M | I write notes to remind myself of what I need to do. | | x | | | | |
| TMBS6M | I make a list of things to do each day and check off each task as it is accomplished. | | | | | x | |
| TMBS7M | I carry an appointment book with me or use my phone to keep track of appointments. | | x | | | x | |
| TMBS8M | I keep a daily log of my activities. | | x | | | | |
| TMBS9M | I use an in-basket and out-basket for organizing paperwork. | | x | | | | |
| TMBS10M | If I know I will have to spend time waiting, I bring along something I can work on. | | x | | | x | |
| TMBS11M | I find places to work that will allow me to avoid interruptions and distractions. | | | | | | |
| TMBS1PO | When I am somewhat disorganized I am better able to adjust to unexpected events. | | | | | x | |
| TMBS2PO | I find that I can do a better job if I put off tasks that I don't feel like doing than if I try to get them done in the order of their importance. | | | x | | x | |
| TMBS3PO | I can find the things I need for my daily activities more easily when my space is messy and disorganized than when it is neat and organized. | | | x | | x | |

| Item Number | Item Content | Method of Testing | | | | | |
|---|---|---|---|---|---|---|---|
| | | Internal Consistency | ME Gender | ME Early vs. Middle Age | ME Middle vs. LaterAge | ME Early vs. Later Age | ME Temporal |
| TMBS4PO | I have some of my most creative ideas when I am disorganized. | | | | x | x | |
| TMBS5PO | When I make a things-to-do list at the beginning of the day, it is forgotten or set aside by the end of the day. | | | | | x | |
| TMBS6PO | My days are too unpredictable for me to plan and manage my time to any great extent. | | | | | x | |
| TMBS7PO | At the end of the day I leave a clear, well-organized space. | | | x | x | x | x |
| TMBS8PO | The time I spend scheduling and organizing my day is time wasted. | | | | x | x | x |
| TMBS1PCT | I underestimate the time that it will take to accomplish tasks. | | | | | | |
| TMBS2PCT | I find it difficult to keep to a schedule because others take me away from my tasks. | | | | | | |
| TMBS3PCT | I feel in control of my time. | | | | | x | |
| TMBS4PCT | I must spend a lot of time on unimportant tasks. | | | | | | |
| TMBS5PCT | I find myself procrastinating on tasks that I don't like but that must be done. | | | | | | |
| TMQ1SRP | Do you make a list of things you have to do each day? | | | | | | |
| TMQ2SRP | Do you plan your day before you start it? | | | | | x | |
| TMQ3SRP | Do you make a schedule of activities you have to do on work days? | | | | | | |
| TMQ4SRP | Do you write a set of goals for yourself for each day? | | x | | | x | |
| TMQ5SRP | Do you spend time each day planning? | | x | | | | |
| TMQ6SRP | Do you have a clear idea of what you want to accomplish during the next week? | | | | | x | |
| TMQ7SRP | Do you set and honor priorities? | | x | | | x | |

| Item Number | Item Content | Method of Testing | | | | | |
|---|---|---|---|---|---|---|---|
| | | Internal Consistency | ME Gender | ME Early vs. Middle Age | ME Middle vs. LaterAge | ME Early vs. Later Age | ME Temporal |
| TMQ1LRP | Do you usually keep your desk clear of everything other than what you are currently working on? | x | N/A | N/A | N/A | N/A | N/A |
| TMQ2LRP | Do you have a set of goals for the entire quarter? | x | N/A | N/A | N/A | N/A | N/A |
| TMQ3LRP | The night before a major assignment is due, are you usually still working on it? | x | N/A | N/A | N/A | N/A | N/A |
| TMQ4LRP | When you have several things to do, do you think it is best to do a little bit of work on each one? | x | N/A | N/A | N/A | N/A | N/A |
| TMQ1TA | Do you often find yourself doing things which interfere with your work simply because you hate to say "No"□ to people? | | | | x | x | |
| TMQ2TA | Do you feel you are in charge of your own time, by and large? | | | | | x | |
| TMQ3TA | Do you believe there is room for improvement in the way you manage your time? | | | | | x | |
| TMQ4TA | Do you make constructive use of your time? | | x | | | x | |
| TMQ5TA | Do you continue unprofitable routines or activities? | | | | | x | |
| TSQ1EO | Do you ever have trouble organizing the things you have to do? | | | | | | x |
| TSQ2 | Do you ever find that time just seems to slip away? | | | | | | |
| TSQ3SR | Do you have a daily routine which you follow? | | | x | | x | x |
| TSQ4SP | Do you often feel that your life is aimless, with no definite purpose? | | | | | x | |
| TSQ5PO | Many of us tend to day-dream about the future. Do you find this happening to you? | | | x | x | | x |
| TSQ6 | And what about the past? Do you find yourself dwelling on the past? | | | | | | |

| Item Number | Item Content | Method of Testing | | | | | |
|---|---|---|---|---|---|---|---|
| | | Internal Consistency | ME Gender | ME Early vs. Middle Age | ME Middle vs. LaterAge | ME Early vs. Later Age | ME Temporal |
| TSQ7P | Once you've started an activity, do you persist at it until you've completed it? | | | x | | x | x |
| TSQ8SP | Do you ever feel that the things you have to do during the day just don't seem to matter? | | | | | x | |
| TSQ9SR | Do you plan your activities from day to day? | | x | | | | |
| TSQ10 | Do you tend to leave things until the last minute? | | | | | | |
| TSQ11EO | Do you find that during the day you are often not sure what you have to do next? | | x | | | | x |
| TSQ12EO | Do you take a long time to get going? | | | | | | x |
| TSQ13EO | Do you tend to change rather aimlessly from one activity to another during the day? | | | | | | x |
| TSQ14P | Do you give up easily once you've started something? | | | x | | x | x |
| TSQ15SR | Do you plan your activities so that they fall into a particular pattern during the day? | | x | x | | | |
| TSQ16SR | Could you tell how many useful hours you accomplished last week? | | | | | | |
| TSQ17 | Do you think you do enough with your time? | | | | | | |
| TSQ18SP | Do you get bored with your day-to-day activities? | | | | | x | |
| TSQ19SP | Looking at a typical day in your life, do you think that most things you do have some purpose? | | | x | | x | |
| TSQ20SR | Do your main activities during the day fit together in a structured way? | | | | | | |
| TSQ21 | Do the important interests/activities in your life tend to change frequently? | | | | | | |
| TSQ22 | Do your main interests/activities fulfill some purpose in your life? | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| TSQ23P | Do you have any difficulty finishing activities once you've started them? | x | | x | x |
| TSQ24PO | Do you spend time thinking about opportunities that you have missed? | x | x | | x |
| TSQ25SP | Do you ever feel that the way you fill your time has little use or value? | | | x | |
| TSQ26PO | Do you spend time thinking about what your future might be like? | x | x | | x |

Table 28

*Item content of proposed time management scale*

| Item | Item Content |
|---|---|
| Assess | |
| TMBS M 11 | I find places to work that will allow me to avoid interruptions and distractions. |
| TMBS PO 1 | When I am somewhat disorganized I am better able to adjust to unexpected events. (R) |
| TMBS PO 5 | When I make a things-to-do list at the beginning of the day, it is forgotten or set aside by the end of the day. (R) |
| TMBS PO 6 | My days are too unpredictable for me to plan and manage my time to any great extent. (R) |
| TSQ EO 1 | Do you ever have trouble organizing the things you have to do? |
| TSQ EO 12 | Do you take a long time to get going? |
| TSQ EO 13 | Do you tend to change rather aimlessly from one activity to another during the day? |
| Plan | |
| TMBS GP 1 | When I decide on what I will try to accomplish in the short term, I keep in mind my long-term objectives. |
| TMBS GP 2 | I review my goals to determine if they need revising. |
| TMBS GP 3 | I break complex, difficult projects down into smaller manageable tasks. |
| TMBS GP 4 | I set short-term goals for what I want to accomplish in a few days or weeks. |
| TMBS GP 5 | I set deadlines for myself when I set out to accomplish a task. |
| TMBS GP 6 | I look for ways to increase the efficiency with which I perform my daily activities. |
| TMBS GP 7 | I finish top priority tasks before going on to less important ones. |
| TMBS GP 9 | During a typical day I evaluate how well I am following the schedule I have set down for myself. |
| TMBS GP 10 | I set priorities to determine the order in which I will perform tasks each day. |
| TMQ SRP 1 | Do you make a list of things you have to do each day? |
| TMQ SRP 3 | Do you make a schedule of activities you have to do on work days? |
| Monitor | |
| TSQ 2 | Do you ever find that time just seems to slip away? |
| TSQ 6 | And what about the past? Do you find yourself dwelling on the past? |
| TSQ 10 | Do you tend to leave things until the last minute? |
| TSQ SR 16 | Could you tell how many useful hours you accomplished last week? (R) |
| TSQ 17 | Do you think you do enough with your time? (R) |

| | |
|---|---|
| TSQ 20 SR | Do your main activities during the day fit together in a structured way? (R) |
| TSQ 21 | Do the important interests/activities in your life tend to change frequently? |
| TSQ 22 | Do your main interests/activities fulfill some purpose in your life? (R) |
| Control | |
| PCT 1 | I underestimate the time that it will take to accomplish tasks. (R) |
| PCT 2 | I find it difficult to keep to a schedule because others take me away from my tasks. (R) |
| PCT 4 | I must spend a lot of time on unimportant tasks. (R) |
| PCT 5 | I find myself procrastinating on tasks that I don't like but that must be done. (R) |
| TMQ 2 TA | Do you feel you are in charge of your own time, by and large? |
| TMQ 3 TA | Do you believe there is room for improvement in the way you manage your time? (R) |
| TMQ 5 TA | Do you continue unprofitable routines or activities? (R) |

*Note.* Assess = Assessment of time behaviors, Plan = Planning behaviors, Monitor = Monitoring behaviors, Control = Sense of control over time, TMBS = Time Management Behavior Scale, TMBS GP = Goals Setting and Prioritizing, TMBS M = Mechanics of Time Management, TMBS PO = Preference for Organization, PCT = Perceived Control of Time, TMQ = Time Management Questionnaire, TMQ SRP = Short-range Planning, TMQ TA = Time Attitudes, TSQ = Time Structure Questionnaire, TSQ EO = Effective Organization, TSQ SR = Structure Routine

## APPENDIX A – QUESTIONNAIRE DETAIL

**Macan et al. (1990) Time Management Behavior Scale (TMBS)**

Scale: (1) seldom true, (2) occasionally true, (3) true about as often as not, (4) frequently true, (5) very often true

Note: Scale will be randomized so reverse coded items are not in one area.

Directions: TO WHAT EXTENT DO EACH OF THE STATEMENTS ON THE FOLLOWING PAGES ACCURATELY DESCRIBE YOUR ACTIVITIES AND EXPERIENCES IN YOUR WORK? Indicate how accurately each statement describes you by choosing ONE of the alternatives on the scale below and writing the corresponding letter on the blank line next to each item. Mark all your responses directly on the form. THIS IS NOT A TEST. THERE ARE NO RIGHT OR WRONG ANSWERS. Please respond to all the items.

1. When I decide on what I will try to accomplish in the short term, I keep in mind my long-term objectives.
2. I review my goals to determine if they need revising.
3. I break complex, difficult projects down into smaller manageable tasks.
4. I set short-term goals for what I want to accomplish in a few days or weeks.
5. I set deadlines for myself when I set out to accomplish a task.
6. I look for ways to increase the efficiency with which I perform my work activities.
7. I finish top priority tasks before going on to less important ones.
8. I review my daily activities to see where I am wasting time.
9. During a workday I evaluate how well I am following the schedule I have set down for myself.
10. I set priorities to determine the order in which I will perform tasks each day.
11. I carry a notebook to jot down notes and ideas.
12. I schedule activities at least a week in advance.
13. When I find that I am frequently contacting someone, I record that person's name, address, and phone number in a special file.
14. I block out time in my daily schedule for regularly scheduled events.
15. I make notes to remind myself of what I need to do.
16. I make a list of things to do each day and check off each task as it is accomplished.
17. I carry an appointment book with me.
18. I keep a daily log of my activities.
19. I use an in-basket and out-basket for organizing paperwork.
20. I find places to work that will allow me to avoid interruptions and distractions.
21. If I know I will have to spend time waiting, I bring along something I can work on.
22. At the end of the workday I leave a clear, well-organized workspace.

23. When I make a things-to-do list at the beginning of the day, it is forgotten or set aside by the end of the day. (R)
24. I can find the things I need for my work more easily when my workspace is messy and disorganized than when it is neat and organized. (R)
25. The time I spend scheduling and organizing my workday is time wasted. (R)
26. My workdays are too unpredictable for me to plan and manage my time to any great extent. (R)
27. I have some of my most creative ideas when I am disorganized. (R)
28. When I am somewhat disorganized I am better able to adjust to unexpected events. (R)
29. I find that I can do a better job if I put off tasks that I don't feel like doing than if I try to get them done in the order of their importance. (R)
30. I underestimate the time that it will take to accomplish tasks. (R)
31. I feel in control of my time.
32. I must spend a lot of time on unimportant tasks. (R)
33. I find it difficult to keep to a schedule because others take me away from my work. (R)
34. I find myself procrastinating on tasks that I don't like but that must be done. (R)

**Bond and Feather's (1988) Time Structure Questionnaire (TSQ)**

7-point Likert scale (no, never – yes, always)

1. Do you ever have trouble organizing the things you have to do?
2. Do you ever find that time just seems to slip away?
3. Do you have a daily routine which you follow?R
4. Do you often feel that your life is aimless, with no definite purpose?
5. Many of us tend to day-dream about the future. Do you find this happening to you?
6. And what about the past? Do you find yourself dwelling on the past?
7. Once you've started an activity, do you persist at it until you've completed it?R
8. Do you ever feel that the things you have to do during the day just don't seem to matter?
9. Do you plan your activities from day to day?R
10. Do you tend to leave things until the last minute?
11. Do you find that during the day you are often not sure what you have to do next?
12. Do you take a long time to get going?
13. Do you tend to change rather aimlessly from one activity to another during the day?
14. Do you give up easily once you've started something?
15. Do you plan your activities so that they fall into a particular pattern during the day? R
16. Could you tell how many useful hours you put in last week? R
17. Do you think you do enough with your time? R
18. Do you get bored with your day-to-day activities?
19. Looking at a typical day in your life, do you think that most things you do have some purpose? R
20. Do your main activities during the day fit together in a structured way? R
21. Do your main interests/activities in your life tend to change frequently?
22. Do your main interests/activities fulfill some purpose in your life? R
23. Do you have any difficulty finishing activities once you've started them?
24. Do you spend time thinking about opportunities that you have missed?
25. Do you ever feel that the way you fill your time has little use or value?
26. Do you spend time thinking about what your future might be like?

**Britton and Tesser's (1991) Time Management Questionnaire (TMQ)**
5-point Likert scale (never, infrequently, sometimes, frequently, always)

1. Do you make a list of things you have to do each day?
2. Do you plan your day before you start it?
3. Do you make a schedule of activities you have to do on work days?
4. Do you write a set of goals for yourself for each day?
5. Do you spend time each day planning?
6. Do you have a clear idea of what you want to accomplish during the next week?
7. Do you set and honor priorities?
8. Do you usually keep your desk clear of everything other than what you are currently working on?
9. Do you have a set of goals for the entire quarter?
10. The night before a major assignment is due, are you usually still working on it? R
11. When you have several things to do, do you think it is best to do a little bit of work on each one?
12. Do you often find yourself doing things which interfere with your work simply because you hate to say "No" to people? R
13. Do you feel you are in charge of your own time, by and large?
14. Do you believe there is room for improvement in the way you manage your time? R
15. Do you make constructive use of your time?
16. Do you continue unprofitable routines or activities? R

**Smith, Sala, Logie, and Maylor's (2000) Prospective and Retrospective Memory Questionnaire (PRMQ)**

5-point Likert scale (never – very often)

1. Do you decide to do something in a few minutes' time and forget to do it?
2. Do you fail to recognize a place you have visited before?
3. Do you fail to do something you were supposed to do a few minutes later even though it's there in front of you, like take a pill or turn off the kettle?
4. Do you forget something that you were told a few minutes before?
5. Do you forget appointments if you are not prompted by someone else or by a reminder such as a calendar or diary?
6. Do you fail to recognize a character in a radio or television show from scene to scene?
7. Do you forget to buy something you planned to buy, like a birthday card, even when you see the shop?
8. Do you fail to recall things that have happened to you in the last few days?
9. Do you repeat the same story to the same person on different occasions?
10. Do you intend to take something with you, before leaving a room or going out, but minutes later leave it behind, even though it's there in front of you?
11. Do you mislay something, that you have just put down, like a magazine or glasses?
12. Do you fail to mention something to a visitor that you were asked to pass on?
13. Do you look at something without realizing you have seen it moments before?
14. If you tried to contact a friend or relative who was out, would you forget to try again later?
15. Do you forget what you watched on television the previous day?
16. Do you forget to tell someone something you had meant to mention a few minutes ago?

**Temporal Awareness Scale**

5-point scale ranging from (1) *strongly disagree* to (5) *strongly agree*

1. If I have wasted money on a particular activity or item, I try to save it on another activity or item.
2. If I spend money on an activity or item but cannot avail its benefits, I feel a sense of loss.
3. I try to keep track of past expenses of money.
4. The more money I invest in a venture, the more anxious I am to complete it.
5. I regularly budget my money by specifying upper limits on how much I will devote to any given item or activity.
6. Every time I invest money in an endeavor or product, I try to ensure that I get benefits commensurate with my investment.
7. The more money I have spent on a lost cause, the more I will regret having incurred the expense.
8. I feel like I must make sure that past expenses of money are not wasted.
9. If I have wasted time on a particular activity or item, I try to save it on another activity or item.
10. If I spend time on an activity or item but cannot take advantage of its benefits, I feel a sense of loss.
11. I try to keep track of past expenses of time.
12. The more time I invest in a venture, the more anxious I am to complete it.
13. I regularly budget my time by specifying upper limits on how much I will devote to any given item or activity.
14. Every time I invest time in an endeavor or product, I try to ensure that I get benefits commensurate with my investment.
15. The more time I have spent on a lost cause, the more I will regret having incurred the expense.
16. I feel like I must make sure that past expenses of time are not wasted.

**Perrone, Gordon, Fitch, and Civiletto (2003) Adult Career Concerns Inventory – Short Form**

5-point Likert-type scale ranging from 1 (*no concern*) to 5 (*extremely concern*)

Please indicate the level of concern you currently have for each of the tasks listed below:

1. Finding the line of work that I am best suited for.
2. Finding a line of work that interests me.
3. Getting started in my chosen career field.
4. Settling down in a job I can stay with.
5. Becoming especially knowledgeable or skillful at work.
6. Planning how to get ahead in my established field of work.
7. Keeping the respect of people in my field.
8. Attending meetings and seminars on new methods.
9. Identifying new problems to work on.
10. Developing easier ways of doing my work.
11. Planning well for retirement.
12. Having a good place to live in retirement.

**Donnellan, Oswald, Baird, and Lucas (2006) Conscientiousness Scale from the Mini-IPIP**

5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*very much*)

How well do the following statements describe you?

1. Get chores done right away.
2. Often forget to put things back in their proper place (R).
3. Like order.
4. Make a mess of things (R).

**Zacher and Frese (2011) adapted Semmer (1982) Job Complexity Scale**

5-point Likert-type scale ranging from 1 (*very little*) to 5 (*very much*)

1. Do you receive tasks that are extraordinary and particularly difficult?
2. Do you often have to make very complicated decisions in your work?
3. Can you use all your knowledge and skills in your work?
4. Can you learn new things in your work?

**Attention check**

1. Please respond “never” to this item.
2. If you are paying attention, please respond “very often true” to this item.
3. Please respond “sometimes” to this item.
4. Please respond “no concern” to this item.
5. Please respond “strongly agree” to this item

**Reading Comprehension Check (excerpt from The SAT Practice Test #1 available through the College Board, 2016)**

Please read the following passage and respond to the question that follows.

"Why do gift-givers assume that gift price is closely linked to gift-recipients' feelings of appreciation? Perhaps givers believe that bigger (i.e., more expensive) gifts ***convey*** stronger signals of thoughtfulness and consideration. According to Camerer (1988) and others, gift-giving represents a symbolic ritual, whereby gift-givers attempt to signal their positive attitudes toward the intended recipient and their willingness to invest resources in a future relationship. In this sense, gift-givers may be motivated to spend more money on a gift in order to send a "stronger signal" to their intended recipient. As for gift-recipients, they may not construe smaller and larger gifts as representing smaller and larger signals of thoughtfulness and consideration.

1. As it is used in the passage, "convey" most nearly means"
    a. Stop
    b. Leave
    c. Guide
    d. Communicate

**Demographics/Qualitative**

1. What is your age? _____
2. What is your gender?
    a. Male
    b. Female
    c. Other
3. Which race do you identify as?
    a. African American/Black
    b. Asian
    c. Caucasian/White
    d. Native American
    e. Latino/Latina
    f. Other
4. What level of education have you attained?
    a. Less than high school
    b. High school degree or GED
    c. Vocational training
    d. Some college
    e. College degree
    f. Master's degree
    g. Doctoral degree
5. What is your relationship status?
    a. Married
    b. Single
    c. Living with partner
    d. Other
6. How many hours do you work in an average week?
    a. 35-45 hours
    b. 46-55 hours
    c. 56+ hours
7. How long have you worked at your current organization? (in years) _____
8. How long have you worked in your current position? (in years)_____
9. What factors do you believe most influence your ability to manage your time? _____