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Article

Test-retest reliability and internal consistency of the Occupational Resilience Measure (ORM 1.0)

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ABSTRACT

Background: The Occupational Resilience Measure (ORM 1.0) is a 20-item, multidimensional self-report tool for measuring occupational resilience, a construct defined as an individual's ability to persist in performing occupations despite barriers. This study evaluated test-retest reliability and internal consistency and explored the extent to which ORM 1.0 is a reliable measure across a diverse range of activity types.

Methodology: Ninety-four participants completed the test and retest measurements within a 2- to 3-week period. A total of 202 activities were included in the analysis, grouped into leisure (LE) [94], productivity (PD) [35], and self-care (SC) [73].

Results: The estimates of test-retest reliability (95% confidence interval [CI]) for SC, LE, and PD were 0.863 (0.794,0.91), 0.860 (0.793,0.907), and 0.876 (0.771,0.935), respectively, indicating good reliability across the two time points for each of the three categories. The Cronbach's alphas at time point 1 for SC, LE, and PD were 0.744 (0.666, 0.808), 0.711 (0.63, 0.778), and 0.694 (0.517, 0.818), respectively, suggesting acceptable to good internal consistency. Similarly, the estimates of Cronbach's alpha at time point 2 for the three occupational categories were: 0.79 (0.725, 0.842), 0.766 (0.7, 0.82), and 0.775 (0.645, 0.866), respectively, indicating good internal consistency.

Conclusion: The findings suggest that ORM 1.0 has test-retest reliability and internal consistency across leisure, productivity, and self-care occupations. The outcomes support the use of ORM 1.0 in clinical practice and research, although further research could strengthen its psychometric properties.

Keywords: adaptation, endurance, occupational resilience, occupational therapy, perseverance, persistence.

INTRODUCTION

The Occupational Resilience Measure (ORM 1.0) is a new assessment tool for measuring occupational resilience (OR) that requires validation and examination of its psychometric properties to serve as an evidence-based measure (Muriithi & Bimali, 2025). ORM 1.0 is a 20-item self-report tool specifically designed to measure OR as defined in Muriithi & Gupta (2025). It may be administered for up to four activities within a single assessment session. The total score on the Occupational Resilience Measure (ORM 1.0) functions as an indicator of an individual's propensity to persist in an activity in the face of challenges. The overall assessment score is a composite of four subscale scores; History, Experience, Benefits, and Adaptation, that are associated with sustained occupational engagement (Muriithi & Bimali, 2025). When validated ORM 1.0 can inform lifestyle interventions that emphasize sustained activity and are increasingly used as alternative or adjunct treatments for various chronic conditions (Bodai et al., 2018; Rippe, 2018). For instance, activity-focused interventions have demonstrated efficacy in the management of diabetes (Pyatak et al., 2019), depression (Jantz & Wall, 2019; Rethorst & Trivedi, 2013), anxiety (Cramer et al., 2018; Nanthakumar, 2020), and posttraumatic stress disorder (Bryant et al., 2025; Crombie et al., 2023).

In occupational therapy, impaired long-term participation in everyday purposeful activities, or "occupations," is understood to hinder individuals' ability to achieve healthy, fulfilling lives (American Occupational Therapy Association, 2017, 2020; World Federation of Occupational Therapists, 2025). Practitioners, therefore, focus on enabling people to perform occupations they want, need, or are expected to do. Additional intervention frameworks and tools are needed, however, to optimize sustained occupational performance and increase the likelihood that interventions produce lasting outcomes. Such frameworks and tools can help individuals maintain their occupations, even amid unforeseen challenges that emerge across the lifespan.

A newly proposed framework views occupational resilience (OR) as a quantifiable, modifiable construct: an individual's ability to persist in an activity despite obstacles (Muriithi & Muriithi, 2020; Muriithi et al., 2022; Muriithi & Gupta, 2025). As a measurable variable, OR can be targeted through clinical interventions and is shaped by five variables commonly addressed in occupational therapy theory and practice (Muriithi & Bimali, 2025). OR enables practitioners and researchers to examine how adjustments to these variables influence sustained activity performance in clinical studies.

Occupational resilience is defined differently here than in vocational and interdisciplinary research. In these fields, OR is associated with arduous or stressful work roles, such as nursing (Jackson et al., 2007; Lee et al., 2015; Rees et al., 2016), occupational therapy (Rivard & Brown, 2019), and teaching (Vasiliki et al., 2018). Many professionals frequently leave these roles due to stress or other unfavorable work conditions. The ability to maintain performance in such challenging work roles is what is commonly understood as occupational resilience. However, this definition is substantially more restrictive in scope than the one adopted in the present paper, which encompasses all human activities that occupy people's time and are experienced as personally meaningful.

As a construct tied to all human occupations, which may be healthy or not (Muriithi &

Gupta, 2025), occupational resilience differs from psychological resilience, which is rooted in positive psychology (Schwarz, 2018). Psychological resilience reflects positive outcomes despite adversity (Sisto et al., 2019; Wiig et al., 2020) and is measured using tools such as the Connor & Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003), with high scores indicating favorable health outcomes. In contrast, high occupational resilience scores indicate a strong likelihood of continued engagement in a given activity despite adversity, but do not necessarily imply better health or greater psychological resilience.

The present study addresses two primary goals: (1) to evaluate ORM 1.0 in terms of test–retest reliability and internal consistency, and (2) to examine whether ORM 1.0 can be applied reliably to quantify occupational resilience across a broad spectrum of occupational types.

METHODS

The study was approved by the Institutional Review Board (IRB) of the A.T. Still University of Health Sciences (Exempt Protocol #2021-215). The Institutional Review Board (IRB) determined that verbal consent was sufficient and that written informed consent documents were not required. The study was not statistically powered to detect a prespecified effect size, as the analyses were intended to be exploratory and hypothesis-generating. We employed a snowball sampling strategy to recruit 94 adult participants, all English-speaking individuals residing in the United States, comprising 53 women and 41 men. The participants' ages ranged from 19 to 66 years, with a mean of 32.23 years (standard deviation = 12.11). Each participant provided verbal informed consent prior to the administration of ORM 1.0. ORM 1.0 was administered on two occasions, separated by an interval of 2–3 weeks between assessments. There is no evidence supporting specific time intervals in similar studies (Marx et al., 2003). We selected a 2–3-week interval as appropriate because it is sufficiently long to minimize the likelihood that participants would recall their pretest responses at the time of the posttest, yet brief enough to reduce the probability of substantive changes in occupational resilience. Each participant completed a brief semi-structured interview to identify target activities for assessment, guided by individual preferences and interests. Data collection (interviews and surveys) was conducted either in person, by telephone, or via virtual conferencing platforms. The interview guide, including all questions used to structure the interviews, is presented in Table 1.

Table 1: ORM 1.0 Interview Guide

What are some activities [occupations]…
a) that help you feel better when you are very discouraged and feel like giving up?
b) you wish you did more often because they improve your emotional health?
c) you wish you did less often because doing them leads you into problems?
d) you wish you could stop doing but are unable to stop?
e) that take too much of your time and leave less time for other things?
f) that cause you concern because they take too much of your money or other resources?
g) you do even if they bring significant barriers or risks?
h) you can't imagine no longer doing in the future?
i) you would certainly stop if not for being forced or encouraged by others?

Following the interview, each participant identified the three or four most salient activities for subsequent rating. To minimize selection bias, participants were explicitly

encouraged to include activities they perceived as having either beneficial or detrimental effects on their health (see Table 1). Occupational resilience was assessed using ORM 1.0 scale. The resulting scores were entered into a Microsoft Excel spreadsheet. Demographic data were also recorded; however, unique identifiers were used in the spreadsheet to protect participants' identities. A separate, secure document linking these pseudonyms to participants' actual names and contact information was maintained independently of the main dataset. Approximately two to three weeks later, follow-up scores were obtained from the same participants, using the same set of activities.

Data Analysis

Derivation of Analysis Dataset: Figure 1 summarizes the steps taken to derive the analysis dataset. This analysis aimed to estimate the properties of the Occupational Resilience Measure (ORM 1.0) separately for three activity categories: leisure, productivity, and self-care. In total, 94 participants completed the survey at two time points.

The participants reported 340 occupational activities, of which 35 were described as negatively affecting health, and 202 were unique. Rather than stratifying by participant characteristics such as age or occupation, participants were given the opportunity to identify and select activities they deemed valuable and significant during the interview process. This approach ensured that the data accurately represented activities deemed personally meaningful to the participants.

The 202 unique activities were further grouped into three broad categories applied in popular occupational therapy theories: leisure (94 activities), productivity (35 activities),

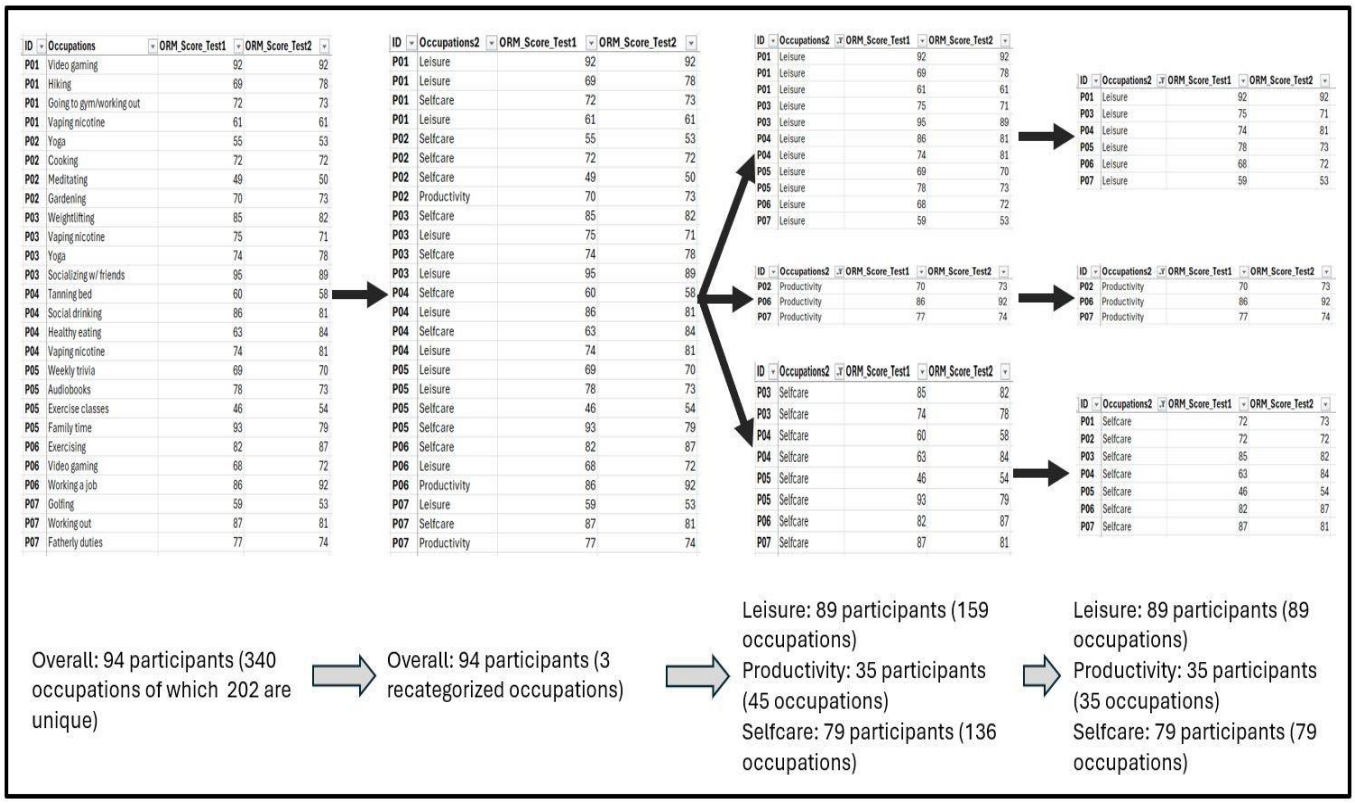

Figure 1: Derivation of the analysis dataset

and self-care (73 activities).

Three separate datasets were obtained corresponding to each of the broad activity categories. For subjects who contributed more than one activity score in a specified category, one of the rows was selected at random (to ensure that each subject had exactly one measurement in the test and one measurement in the retest). The random selection was conducted using a simple random sampling approach, in which each activity within a participant's category was assigned equal probability. This was implemented in R using the sample n() function available in the "dplyr" package. Thus, we derived three datasets: one for leisure (89 participants), one for productivity (35 participants), and one for self-care (79 participants). It should be noted that these datasets contained overlapping participants but distinct activities.

Analysis

Descriptive statistics were reported as mean (standard deviation), median (interquartile range), and (minimum, maximum) for continuous variables; and as frequency (percentage) for categorical variables. Uncertainty in parameter estimates was reported using a two-sided 95% confidence interval. The analyses were conducted using R version 4.3.2.
Internal consistency: Cronbach's alpha was used to assess the questionnaire's internal consistency. Internal consistency was estimated separately at each time point for the three activity categories, based on participants' responses to the four subtest categories: History, Experience, Benefit, and Adaptation. We analyzed data from 35 participants (productivity), 73 (self-care), and 94 (leisure). Assuming a Cronbach's alpha of 0.70, with the sample size from our study, the approximate half-widths of the two-sided 95% confidence intervals would be ±0.22 (productivity), ±0.15 (self-care), and ±0.13 (leisure). Assuming an ICC of 0.80, the corresponding half-widths of the two-sided 95% confidence intervals would be ±0.13, ±0.09, and ±0.08, respectively.

Test-retest measures: The Test-retest reliability was assessed visually using a combination of scatterplot and Bland-Altman plots. The estimate of the test-retest correlation was obtained using Pearson's correlation. The intraclass correlation coefficient (ICC) was estimated from a one-way random-effects model to assess test-retest reliability. The cutoff for Cronbach's alpha was based on Nunnally's rule of thumb, which suggests values in the range of 0.6-0.7 would be considered acceptable for exploratory research. For ICC, the point estimate was> 0.80, and the 95% confidence interval contained 0.90. This has been interpreted as good/moderate agreement and is consistent with the recommendation in the literature (Koo & Li, 2016).
The test-retest agreement was assessed using Lin's concordance correlation coefficient. Lin's concordance correlation coefficient combines measures of precision and accuracy to determine the deviation of observed data from the perfect agreement line. While reliability is the ability of the tool to replicate the same response ordering when measured twice under the same conditions, agreement is a stricter measure and requires the test not only to preserve the relative order but also to produce exactly the same results at both time points.

RESULTS

The scatterplot and Bland-Altman plot for each of the three activity categories are presented in Figure 2. Scatterplots indicate a positive correlation between the measurements across the two time points. The Bland-Altman plot shows that more than 95% of the data lies within the limits of agreement, indicating good test-retest reliability.

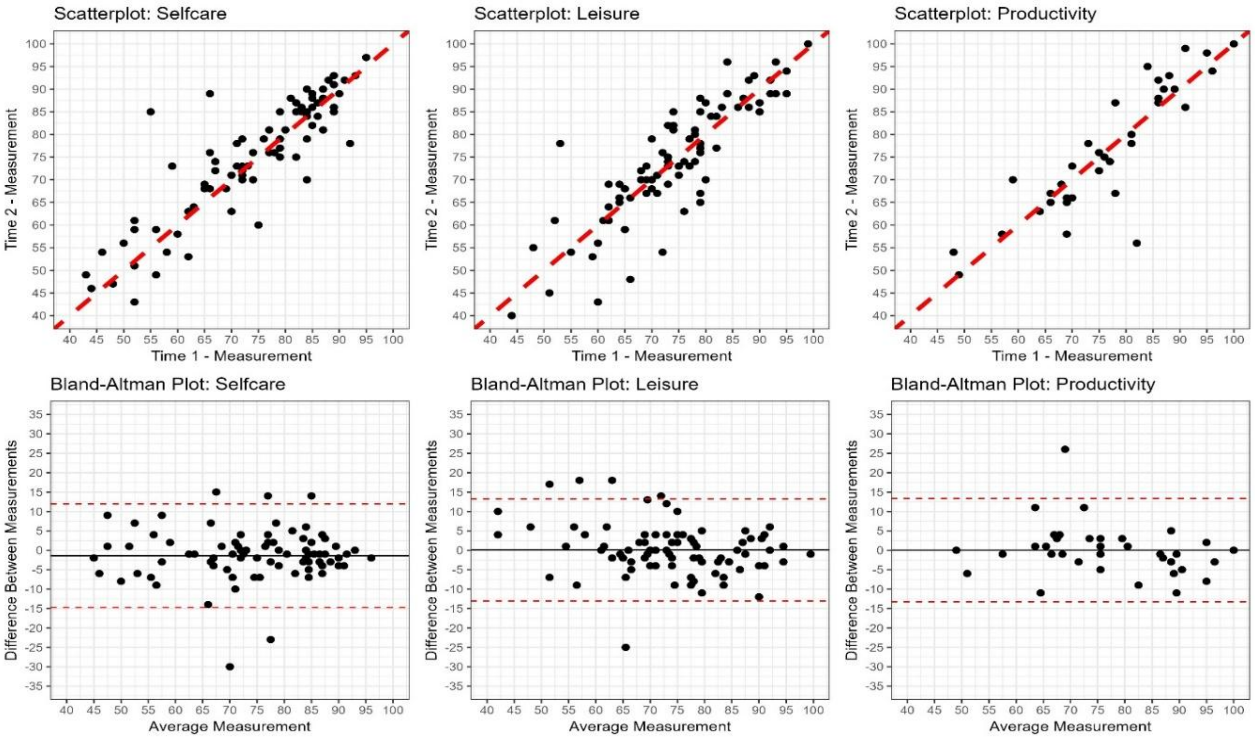

Figure 2: Scatterplot and Bland-Altman Plot

The estimates of the test-retest correlation, test-retest reliability, and test-retest agreement are summarized in Table 2. The test-retest correlations (95% CI) for selfcare, leisure, and productivity were 0.867 (0.799,0.913), 0.866 (0.800,0.911), and 0.879 (0.771,0.937) respectively. These estimates indicated strong correlations between ORM scores at the two time points for each occupational category. The estimates of test-retest reliability (95% CI) for selfcare, leisure, and productivity were: 0.863 (0.794,0.91), 0.860 (0.793,0.907), and 0.876 (0.771,0.935), respectively, indicating good reliability across the two time points for each of the three occupational categories. The estimates of test-retest agreement (95% CI) for selfcare, leisure, and productivity are 0.862 (0.793,0.909), 0.859 (0.793,0.904), and 0.873 (0.767,0.933), respectively, indicating moderate agreement.

Cronbach's alphas at time-point 1 (95% CI) for selfcare, leisure, and productivity were: 0.744 (0.666,0.808), 0.711 (0.63,0.778), and 0.694 (0.517,0.818), respectively, suggesting acceptable to good internal consistency. Similarly, the estimates of Cronbach's alpha at time-point 2 (95% CI) for the three occupational categories are: 0.79 (0.725,0.842), 0.766 (0.7,0.82) and 0.775 (0.645,0.866), respectively, indicating good internal consistency at time-point 2.

Table 2: Estimates (95% CI)

	Selfcare	Leisure	Productivity
Pearson' correlation	0.867 (0.799,0.913)	0.866 (0.800,0.911)	0.879 (0.771,0.937)
ICC	0.863 (0.794,0.91)	0.860 (0.793,0.907)	0.876 (0.771,0.935)
Lin's concordance correlation	0.862 (0.793,0.909)	0.859 (0.793,0.904)	0.873 (0.767,0.933)
Cronbach alpha: Test (Time1)	0.744 (0.666,0.808)	0.711 (0.63,0.778)	0.694 (0.517,0.818)
Cronbach alpha: Re-test (Time2)	0.79 (0.725,0.842)	0.766 (0.7,0.82)	0.775 (0.645,0.866)

The objectives of this investigation were to: (1) examine the test–retest reliability and internal consistency of ORM 1.0, and (2) determine the extent to which ORM 1.0 serves as a reliable measurement instrument across a broad spectrum of activity types. The analysis showed evidence of good test-retest correlation, reliability, and agreement across the observed time points. The findings also indicate that ORM 1.0 demonstrates acceptable to good internal consistency across the two assessed time points and appears applicable to a broad range of activity types.

Evidence supporting the test–retest reliability of ORM 1.0 has been demonstrated, thereby underscoring its potential utility as an instrument for assessing occupational resilience and as a standardized outcome measure in occupation-based interventions. The integration of pretest and posttest assessments within research designs may enhance the predictive validity of ORM 1.0 overall scores for estimating the long-term sustainability of activity performance or lifestyle modifications. Furthermore, studies employing ORM 1.0 metrics to evaluate lifestyle modifications may delineate score thresholds that distinguish between durable, sustainable changes and short-lived, transient alterations in occupational performance.

The collection of pretest and posttest data enables systematic examination of how the intervention influences each of the four subscales. This is particularly important, given that well-established theoretical frameworks and evidence-based clinical approaches exist to address these four variables in occupational therapy (Muriithi & Bimali, 2025). The History subscale targets the development of stable routines and predictable performance patterns, while the Experience subscale focuses on remediating skill deficits, a frequent objective in occupational therapy (American Occupational Therapy Association, 2020; Taylor et al., 2024; Townsend & Polatajko, 2007). Interventions targeting the Benefits subscale focus on improving low motivation, a frequent barrier to engaging in activities or making lifestyle changes (Taylor et al., 2024). Finally, Adaptation includes interventions that strengthen problem-solving abilities, helping to maintain performance even as conditions or contexts change (DaLomba et al., 2018; Schkade & Schultz, 1992; Schultz & Schkade, 1992).

ORM 1.0's internal consistency and multidimensional quality make its scores valuable for clinical interventions. The scores guide clinical decisions by indicating the domain(s) with greater deficits, if applicable, thereby allowing therapists to focus on the deficit areas for the specified person and activity of interest (Muriithi & Bimali, 2025).

That ORM 1.0 demonstrated reliability in assessing various types of activities is of considerable significance. This quality means that ORM 1.0 can be administered to evaluate different activities for one individual. This becomes particularly important when incorporating several activities into a client's activity-based treatment plan, because it enables each targeted activity to be evaluated and monitored separately for any changes using the same standardized scale. In some cases, the goal of interventions may be to lower ORM 1.0 scores rather than raise them—for instance, when dealing with unhealthy, illegal, or taboo activities that people engage in, which are now also classified as occupations (Twinley, 2013, 2021). Therefore, by focusing on selected activities, clinicians and researchers can leverage ORM 1.0 scores to determine the direction and magnitude of changes in occupational resilience needed to optimize health. This can advance lifestyle-

related interventions by making target activities individually measurable and trackable.

DISCUSSION

The objectives of this investigation were to: (1) examine the test–retest reliability and internal consistency of ORM 1.0, and (2) determine the extent to which ORM 1.0 serves as a reliable measurement instrument across a broad spectrum of activity types. The analysis showed evidence of good test-retest correlation, reliability, and agreement across the observed time points. The findings also indicate that ORM 1.0 demonstrates acceptable to good internal consistency across the two assessed time points and appears applicable to a broad range of activity types.

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changes in occupational resilience needed to optimize health. This can advance lifestyle-related interventions by making target activities individually measurable and trackable.

Limitations

Although the study aimed to encompass a broad range of activity types, most participants did not report engaging in activities typically associated with adverse health outcomes. The exclusion constrains the external validity of the findings by restricting the assessment of ORM 1.0 as an instrument for measuring occupational resilience in relation to behaviors such as alcohol use, tobacco consumption, and gambling. Moreover, many participants selected activities with which they were already familiar, leading to a reduced frequency of very low ORM 1.0 scores in the dataset. The use of a snowball sampling strategy and the reliance on a relatively homogeneous sample of English-speaking individuals residing in the United States further constrain the external validity and generalizability of the findings. In addition, conceptual and practical overlaps among the self-care, leisure, and productivity categories likely occurred; for example, some leisure activities may simultaneously qualify as self-care or productivity, complicating efforts to classify them into a single discrete category. Finally, because data were obtained exclusively from adults living in the United States, the results may not be fully representative of, or directly transferable to, international populations.

CONCLUSION

This study found that ORM 1.0 demonstrated test-retest reliability and internal consistency across a range of daily activities. These results support the use of ORM as a potential instrument in both clinical practice and research, serving as a measure of the newly defined occupational resilience construct. More studies are recommended to strengthen ORM 1.0 as an evidence-based measure of this construct. Some planned future studies include criterion validity testing and exploratory factor analysis.

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Conflict of Interest Statement: The first author developed ORM 1.0 and holds copyright. The second and third authors declare they have no conflicts of interest

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