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AN ANALYSIS OF THE RELATIONSHIP BETWEEN CHRISTIAN FAITH AND MENTAL WELLBEING UTILIZING ITEM RESPONSE THEORY

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Abstract

There is a growing concern that more and more American university students suffer from mental distress or disorder. Numerous prior studies have confirmed religious faith and practice to be a promising avenue for alleviating mental problems. Using item response theory (IRT), the current study aimed to verify this assertion with a sample of 436 university students. In this study, the independent variable is faith status/church attendance, which consists of four categories: "I continue to attend church and have faith in Christ," "I still attend church but have serious doubts of my faith in Christ," "I have not attended church for over one year but I maintain my faith in Christ," and "I am not attending church and have abandoned my faith in Christ." The dependent variable is the IRT's theta score derived from measures of mental issues in multiple dimensions, including anxiety, depression, loneliness, sadness, suicide attempts, anorexia, etc. For the entire sample, it was found that Christian faith and church attendance must be present together to generate a protective effect against mental distress. Participants who claimed themselves as faithful but did not attend church could not benefit from Christianity as a protective factor. When the sample was divided by gender and race, attending church and keeping faith active still protected students against mental diseases, but the magnitudes varied.

Keywords

Religion, Christianity, Mental Health, Item Response Theory

1. Introduction

There is a growing concern that in recent years more and more American university students suffer from mental distress or disorder. Numerous prior studies have confirmed that religious faith and practice is a promising avenue for improving mental wellbeing (e.g. Bonelli et al., 2012; Koenig, King, & Carson, 2012). The current study aimed to verify these previous findings with a novel contribution, namely, the use of a modern psychometric approach. While item response theory (IRT) is popular among educational researchers to assess cognitive skills, the predominant methodology for assessing non-cognitive domains, such as personality, attitude, and psychopathology, is still the classical test theory (CTT) (Ogunsakin & Shogbesan, 2018), even though IRT can yield more precise measurements than CTT, technically speaking. One of the arguments for employing IRT in this health study is that concepts such as pain, fatigue, depression, and anxiety are so universal that participants should be able to recognize the symptoms regardless of their countries, cultures, ages, and gender (Reise, 2009). Traditionally, factor analysis is a common method for verifying the psychometric attributes of the survey. If the survey is found to be uni-dimensional, all item scores are summed into a composite score. By doing so, all items are treated equally; however, this practice is questionable. Specifically, in a mental health survey, the respondents are asked to report whether they experienced certain psychological problems, such as suicide attempts, depression, loneliness, and sadness. Obviously, suicide attempts and depression are more severe than loneliness and sadness, and thus it would be misleading to view two persons who have the same scores as equally distressed. IRT is a powerful tool that can rectify this situation. Hence, in this study, IRT was adopted to assess the mental wellbeing of 436 students enrolled in a US Christian university, based upon the ranking of severity of 42 mental issues.

It was found that for the entire sample Christian faith and church attendance must be present together to generate a protective effect against mental distress. Participants who claimed themselves as faithful but did not attend church could not benefit from Christianity as a protective factor. The most vulnerable group consists of students who still attend church but are doubtful of their faith. In terms of the severity of mental disorders, this group fares even worse than the one giving up both personal faith and religious community. When the whole sample was divided by gender and race, attending church and keeping faith active still protected students

against mental diseases, but the magnitudes varied. To be more specific, male students could benefit more from the protective effect than their female counterparts, and this protective effect seemed to be weakened among biracial and multiracial students.

2. Mental Health Crisis of University Students

More university students than ever are suffering from various mental illnesses. This trend had been confirmed by multiple sources. For example, the nationwide data set collected from 600 US colleges and universities by the Center for Collegiate Mental Health's (CCMH, 2019a) indicates that distress levels for depression, generalized anxiety, and social anxiety has been increasing since 2012 (Center for Collegiate Mental Health, 2019a). Specifically, in 2018 73% of participants ($n=264,681$) had depression scores above the cutoff, compared with 70% in 2010 ($n=87,884$). Scores above the low cut point indicates potential distress; thus, further assessment is needed. The same data source also reveals that the frequency of generalized anxiety increased from 68% in 2010 to 73% in 2018, while that of social anxiety rose from 54% to 60% over the same period of time. Further, non-suicidal self-injury and serious suicidal ideation also increased for the eighth year in a row since 2010 (Center for Collegiate Mental Health, 2019b).

In a similar vein, the National Survey on Drug Use and Health (NSDUH; $n=611,880$) indicates that from 2005 to 2017, rates of major depressive episode substantively increased (from 8.7% to 13.2%) among adolescents aged 12 to 17. Among young adults aged 18 to 25 the number increased from 8.1% to 13.2% during the same period of time. Among young adults aged 18 to 25, severe psychological distress and suicide-related outcomes, such as suicidal ideation, plans, attempts, and deaths, also increased by 71% between 2008 and 2017 (Twenge et al., 2019).

A smaller survey study conducted by Entwistle, Eck, and White (2019) concurred with the national trends discussed above. Based on survey data collected in three universities, Entwistle, Eck, and White (2019) found that the top five mental issues reported by college students are anxiety, stress, interpersonal concerns, family relationships, and depression. 15 to 43% of participants had prior therapeutic experience, 10-11% are currently on medications, and 33% have used the Counseling Center previously. Regarding serious symptomology, 7-10% of counseling sessions involved crisis situations, and student hospitalizations substantively increased.

3. The Relationship between Religion and Mental Health

Among the different approaches to countermeasure this crisis, religion has been considered a promising route. Previous studies indicate that religiosity and spirituality protect believers against mental distress. The history of this type of study can be traced back to Jung's (1970a, 1970b) seminal work on the relationship between human spirituality and well-being. In Jung's view, most problems of his patients were concerned with looking for a religious perspective on life. Recent research found that religion could improve mental wellbeing by fostering joy or hope, (Cole & Pargament, 1999), offering people a sense of meaning and a purpose in life (Oman & Thoresen, 2003), providing individuals with a social support network (Oman & Reed, 1998), and equipping people with coping mechanisms (Bryant-Davis & Wong, 2013). Specifically, meditation and prayer leads to a peaceful and serene state of consciousness. When activities in the parietal areas of the brain are reduced, the person experiences a sense of timelessness, spacelessness, and peacefulness (Newberg & Waldman, 2013). All of the above could result in significant stress reduction and the development of a resilient mind.

These findings concurred with nationwide and/or longitudinal data. For example, according to 2016 national statistics, the incident suicide risk of participants who attended religious services once per week or more was 84% lower than their counterparts who never attended religious services (Koenig, 2016). Further, according to the aggregated data (2012-2018, $n=1,073,758$) collected by CCMH (2019), students who identified themselves as Christians (68%), Catholics (70%), or Jews (64%) in regard to their religious or spiritual preference were less likely to suffer from depression than agnostics (80%) and atheists (79%). The protective effect of religiosity and spirituality was also observed in generalized anxiety and social anxiety. The percentage of Catholics, Christians, and Jews who suffered from generalized anxiety (69% across all three groups) was substantively lower than that of agnostics (78%) and atheists (75%). The same pattern recurs in the categories of social anxiety, academic anxiety, family distress, thought of ending life, and suicide attempt, as shown in Table 1. Although these data are revealing in terms of shedding light upon the relationship between religion and mental health, it is crucial to point out that the survey only asked for religious and spirituality preferences, not religious affiliation or practices. Hence, whether those students practice their religious faith or not is unknown. As a remedy, in the survey used in the current study, participants were explicitly asked for reporting both their faith and their church attendance.

Table 1: *Mental Distress by Religious and Spiritual Preference among US College Students*

	Agnostic	Atheist	Buddhist	Catholic	Christian	Hindu	Jewish	Muslim	No preference	Self-identified
Depression	80%	79%	78%	68%	70%	78%	64%	78%	76%	78%
Generalized anxiety	78%	75%	74%	69%	69%	72%	69%	72%	74%	76%
Social anxiety	68%	68%	61%	53%	54%	57%	49%	55%	61%	61%
Academic anxiety	73%	72%	71%	63%	65%	71%	56%	77%	70%	70%
Family stress	66%	65%	68%	49%	56%	52%	47%	65%	64%	70%
Thought of ending life	46%	47%	45%	31%	33%	38%	28%	36%	41%	45%
Suicide attempt	12%	12%	16%	6%	8%	8%	6%	8%	11%	16%

CCMH used the term “religious and spiritual preference,” but it was up to the participant to define its meaning. Needless to say, this phrase could mean different things to different people. Koenig, King, and Carson (2012) documented how religiosity/spirituality and clinical research were integrated. In their view, religion is community-driven, visible, formal, systematic, behavior-oriented, and tradition-oriented, whereas spirituality is individualistic, hidden, informal, unsystematic, and emotion-based. However, the line between religiosity and spirituality is blurred. Indeed, religiosity can also be individualistic and emotion-driven. James (1902/1985) defined religion as “the feelings, acts, and experiences of individual men, in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider the divine” (p. 34). On the other hand, spirituality can be loosely defined as an awareness and desire for a supreme cosmic power (Bowland et al., 2012; Hill & Pargament, 2003). This type of inclusive definition, however, is not consensual (Aten & Leach, 2009), thus leading to “‘ungrounded, nebulous, imprecise, and vague’” understandings of the concept (Milacci, 2006, p. 230). Hence, this study did not make a sharp demarcation between religiosity and spirituality. Rather, the author adopted a more conventional approach by viewing religion as joining a community (church attendance) and confessing a belief (faith in Christ).

4. Method

4.1 Data Source and Sample

The data of this study are sourced from a survey administered by the health center in a Christian university in the American Southwest. Four hundred and thirty-six undergraduate students participated in the survey. Among them 315 are females (72.4%), 119 are males

(27.35%), and 1 is transgender (0.002%). The mean age of the sample is 20.23, and the standard deviation is 2.25.

4.2 Variables and Measures

Koenig and Bussing (2010) reduced the complexity of religion to three dimensions only by developing the five-item *Duke University Religion Index* (DUREL). In this scale, the first question is concerned with participation in religious meetings whereas the second one focuses on individual religious activities. The last three items belong to a category entitled “religious belief or experience.” Although the author of this paper did not adopt DUREL as the instrument, following a similar line of reasoning, the author further simplified the religious variable, which is the independent variable for this study, by combining the measurement of external religious behaviors and internal religious faith into one question: “Which of the following responses best describes your church attendance and faith?” The following four possible answers were provided to the participants:

- I continue to attend church and have faith in Christ
- I have not attended church for over one year but I maintain my faith in Christ
- I still attend church but have serious doubts of my faith in Christ
- I am not attending church and have abandoned my faith in Christ.

The dependent variable is the mental health of the students. This variable is the IRT’s severity score derived from 45 questions in a standard survey administered by a university health center (see the list below). Three items were removed later due to psychometric issues.

- Have you ever felt things were hopeless?
- Have you ever felt overwhelmed by all you had to do?
- Have you ever felt exhausted (not from physical activity)?
- Have you ever felt very lonely?
- Have you ever felt very sad?
- Have you ever felt so depressed that it was difficult to function?
- Have you ever felt overwhelming anxiety?
- Have you ever felt overwhelming anger?
- Have you ever intentionally cut, burned, bruised, or otherwise injured yourself?
- Have you ever seriously considered suicide?
- Have you ever attempted suicide?
- Last 12 months diagnosed with/treated for-Anorexia

- Last 12 months diagnosed with/treated for-Anxiety
- Last 12 months diagnosed with/treated for-Attention Deficit and Hyperactivity Disorder
- Last 12 months diagnosed with/treated for-Bipolar Disorder
- Last 12 months diagnosed with/treated for-Bulimia
- Last 12 months diagnosed with/treated for-Depression
- Last 12 months diagnosed with/treated for-Insomnia
- Last 12 months diagnosed with/treated for-Other sleep disorder
- Last 12 months diagnosed with/treated for-Obsessive Compulsive Disorder (OCD)
- Last 12 months diagnosed with/treated for-Panic attacks
- Last 12 months diagnosed with/treated for-Phobia
- Last 12 months diagnosed with/treated for-Schizophrenia
- Last 12 months diagnosed with/treated for-Substance abuse or addiction (alcohol or other drugs)
- Last 12 months diagnosed with/treated for-Other addiction (e.g., gambling, internet, sexual)
- Last 12 months diagnosed with/treated for-Other mental health condition
- Ever diagnosed with depression
- Last 12 months difficult to handle-Academics
- Last 12 months difficult to handle-Career-related issue
- Last 12 months difficult to handle-Death of a family member or friend
- Last 12 months difficult to handle-Family problems
- Last 12 months difficult to handle-Intimate relationships
- Last 12 months difficult to handle-Other social relationships
- Last 12 months difficult to handle-Finances
- Last 12 months difficult to handle-Health problem of a family member or partner
- Last 12 months difficult to handle-Personal appearance
- Last 12 months difficult to handle-Personal health issue
- Last 12 months difficult to handle-Sleep difficulties
- Last 12 months difficult to handle-Other
- Ever received mental health services-Counselor/Therapist/Psychologist

- Ever received mental health services-Psychiatrist
- Ever received mental health services-Other medical provider (e.g., physician, nurse practitioner)
- Ever received mental health services-Minister/Priest/Rabbi/Other clergy
- Ever received mental health services-University Health/Counseling
- Considering seeking help from mental health professional in future

4.3 Data Analysis

Some of the above items listed only two options (“Yes,” “No”), while others have multiple options (e.g., “Yes, in the last two months”, “Yes, in the last 30 days”, etc.). However, the so-called precision in the latter does not seem necessary because whether the symptom happened in the last two months or in the last month might not yield any practical implications. More importantly, data in some response categories are too sparse to facilitate a valid analysis. Hence, multi-level responses to these items were converted to 1 (yes) or 0 (no).

In this study, the preceding measures of mental health are reduced by item response theory instead of factor analysis, which is tied to the paradigm of CTT. Although it is a common practice for factor analysts to combine all item scores into a single composite score, this method leads to two challenging issues. First, factor analysis utilizes the correlation of continuous-scaled data. When the measurement scale is dichotomous, it necessitates use of the tetrachoric correlation (Bonett & Price, 2005), which is extremely computing-intensive. Second, in a composite score all items are treated equally, but some mental issues are significantly more severe than others. For example, no doubt suicide ideation and attempts are worse than loneliness and sadness. In other words, even if two persons have the same composite scores, their mental health conditions could be vastly different.

To counteract the preceding issues, IRT estimates the person attribute and the item attribute simultaneously using binary responses, and then outputs the theta score for each student (Embretson & Reise, 2000). Specifically, this study utilized one-parameter IRT because it does not require a large sample size to yield valid measurements (Embretson & Hershberger, 1999). It was suggested that the minimum sample size requirement for a one-parameter IRT model is 200 because with this sample size standard errors of item parameters would be within 0.14-0.21 (Reeve & Fayers, 2005; Wright & Stone, 1979). The number of observations in this study had double the minimum requirement.

Because the theta output by IRT scores is centered at zero, a student who scores above zero in theta is said to be suffering from more mental health issues. Conversely, a student scored below zero has fewer or no mental health issues. By the same token, mental issues are ranked by IRT's algorithm. A mental issue scored above zero is considered more severe, whereas an issue scored below zero is regarded as mild. In a cognitive test, the psychometric attribute of the test item is called item difficulty, but in a health survey item difficulty became item severity (Cappelleri, Lundy, & Hays, 2014). Unlike factor analysis, in which items with distinct response patterns are classified into subscales or sub-dimensions, IRT simply ranks all items into a hierarchy along a single dimension (Ogunsakin & Shogbesan, 2018; Yu, in press).

Further, item information function and test information function can be obtained from IRT modeling in order to determine the precision level of the inference. Information is defined as the reciprocal of the precision of parameter estimates, and the formula is: $\text{Information} = 1/(\text{variance})$. The Test Information Function (TIF) is the total score of all IIFs in the survey (Yu, in press). Another advantage of IRT is that TIF provides users with valuable insight that cannot be offered by classical test theory: to which students, in terms of severity of mental condition, can we make more precise prediction and draw more valid inferences? After both item severity and student theta were calibrated, they were displayed on the same scale using the dual plot, also known the item-person map. The objective of the dual plot is to depict the relationship between item severity and student theta (Yu, in press).

An initial IRT model was run for detecting misfit items, which cannot yield valid data in alignment with the construct or dimension under study. Item fitness is examined by the mean square ($MS = \text{Chi-square}/\text{degree of freedom}$) and data visualization. After misfits were excluded, another IRT model was built for finalizing the item and person thetas. The students' thetas, indicating their severity of mental distress, were analyzed with reference to their church attendance and faith status using data visualization, ANOVA, and multiple comparison. All these analyses were conducted with SAS (SAS Institute 2018), JMP Pro (SAS Institute, 2017), and SPSS (IBM, 2019). A post hoc power analysis utilizing G*Power (Heinrich-Heine-Universität Düsseldorf, 2019) verified the sample size of this study to be adequate for detecting a true group difference, if any exists.

5. Results

5.1 Misfits

The preliminary IRT model indicates that the mean square (MS) of 12 items is larger than 2. According to Linacre (2017), if MS is larger than 2, then the item might distort the entire measurement system. Nonetheless, many psychometricians do not recommend setting a fixed cut-off (Wang, & Chen, 2005). An alternate practice is to check all mean squares using data visualization. The dot plot in Figure 1 indicates that only three items significantly deviate from the majority, and thus they were removed from the subsequent analysis. These three items are: “Ever felt overwhelmed by all you had to do,” “ever received mental health services-counselor/therapist/psychologist,” and “ever felt exhausted (not from physical activity).”

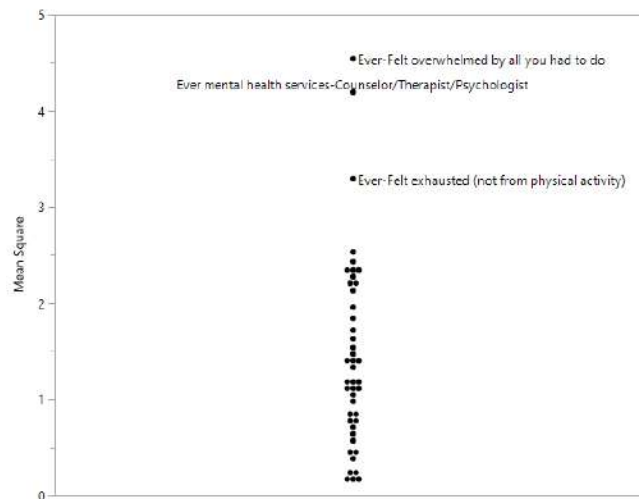


Figure 1: Dot Plot of Mean Squares

5.2 Severity of Mental Issues

Table 2 ranks the severity of all conditions based on IRT. If the score is above zero, the issue is more severe. If the score is below zero, then it is a less pressing issue. There is no surprise to find that Schizophrenia, phobia, bipolar disorder, and suicide attempt are ranked as more severe, whereas anxiety, loneliness, sadness, and seeking help are considered mild.

Table 2: Ranking the Severity of Mental Issues

Item	Severity
Last 12 months diagnosed with/treated for-Schizophrenia	6.7672
Last 12 months diagnosed with/treated for-Phobia	6.0666
Last 12 months diagnosed with/treated for-Bipolar Disorder	5.6537
Ever-Attempted suicide	5.3589
Last 12 months diagnosed with/treated for-Bulimia	5.1284

Item	Severity
Last 12 months diagnosed with/treated for-Substance abuse or addiction (alcohol or other drugs)	5.1284
Last 12 months diagnosed with/treated for-Other addiction (e.g., gambling, internet, sexual)	5.1284
Last 12 months diagnosed with/treated for-Other sleep disorder	4.9390
Last 12 months diagnosed with/treated for-Anorexia	4.5125
Last 12 months diagnosed with/treated for-Obsessive Compulsive Disorder (OCD)	4.4004
Last 12 months diagnosed with/treated for-Other mental health condition	4.2982
Last 12 months diagnosed with/treated for-Attention Deficit and Hyperactivity Disorder (ADHD)	3.9612
Last 12 months diagnosed with/treated for-Insomnia	3.8901
Ever-Seriously considered suicide	3.0955
Last 12 months diagnosed with/treated for-Panic attacks	3.0586
Ever-Intentionally cut, burned, bruised, or otherwise injured yourself	3.0586
Ever mental health services-Psychiatrist	2.7929
Last 12 months difficult to handle-Other	2.6757
Last 12 months diagnosed with/treated for-Depression	2.5148
Last 12 months difficult to handle-Death of a family member or friend	2.2992
Last 12 months diagnosed with/treated for-Anxiety	2.1898
Ever diagnosed with depression	2.1687
Ever mental health services-Other medical provider (e.g., physician, nurse practitioner)	2.0665
Ever mental health services-Minister/Priest/Rabbi/Other clergy	1.9130
Last 12 months difficult to handle-Health problem of a family member or partner	1.6848
Ever received mental health services - University Health/Counseling	1.5075
Last 12 months difficult to handle-Personal health issue	1.4612
Last 12 months difficult to handle-Career-related issue	1.3856
Last 12 months difficult to handle-Intimate relationships	1.2543
Last 12 months difficult to handle-Sleep difficulties	1.2543
Last 12 months difficult to handle-Personal appearance	1.1144
Last 12 months difficult to handle-Other social relationships	0.9534
Last 12 months difficult to handle-Family problems	0.8366
Ever-Felt so depressed that it was difficult to function	0.6727
Ever-Felt overwhelming anger	0.5986
Last 12 months difficult to handle-Finances	0.4406
Last 12 months difficult to handle-Academics	0.0257
Ever-Felt things were hopeless	0.0022
Ever-Felt overwhelming anxiety	-0.7199
Ever-Felt very lonely	-0.8734
Ever-Felt very sad	-1.0054
Consider seeking help from mental health professional in future	-1.5755

5.3 Test Information Function

Based on item severity listed on Table 2, the IRT algorithm estimated the item information function (IIF) of each mental condition. The test information function (TIF), as shown in Figure 2, was constructed by summing all IIFs. This TIF reveals that in this study more

precise information can be obtained for students whose theta score is 2. This information is crucial for specific care to be provided to individual students.

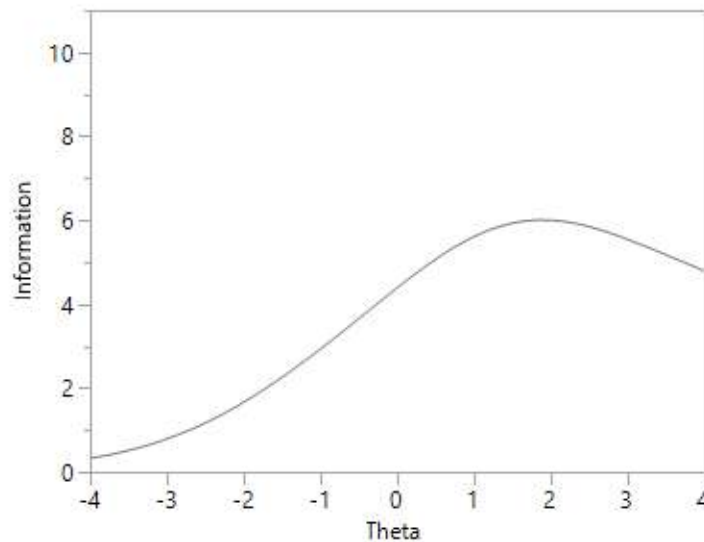


Figure 2: *Dual Plot Displaying Item and Student Attributes*

5.4 Dual Plot

Figure 3 is the dual plot (item-person map) displaying both the distribution of the severity scores of the items (mental conditions) and that of the theta scores of the students. The survey items lean toward the top, while the students lean toward the bottom. In a cognitive test, psychometricians would declare that the test “beats” the students because the values of item difficulty are greater than that of student ability (theta). In the context of this non-cognitive test, the author asserted that many severe mental diseases were beyond most students. That is, only a few students suffered from severe mental conditions, such as suicide attempts; the majority centered on zero (average), and some students earned a negative score, meaning that they were relatively healthy.

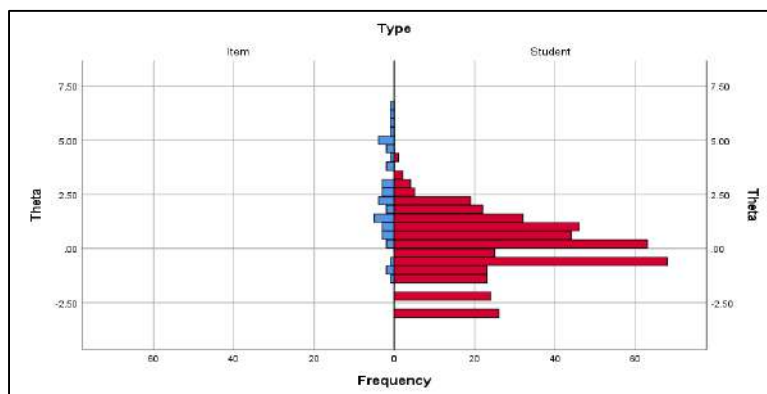


Figure 3: *Dual Plot Displaying Item and Student Attributes*

5.5 Comparison of Theta Score and Composite Score

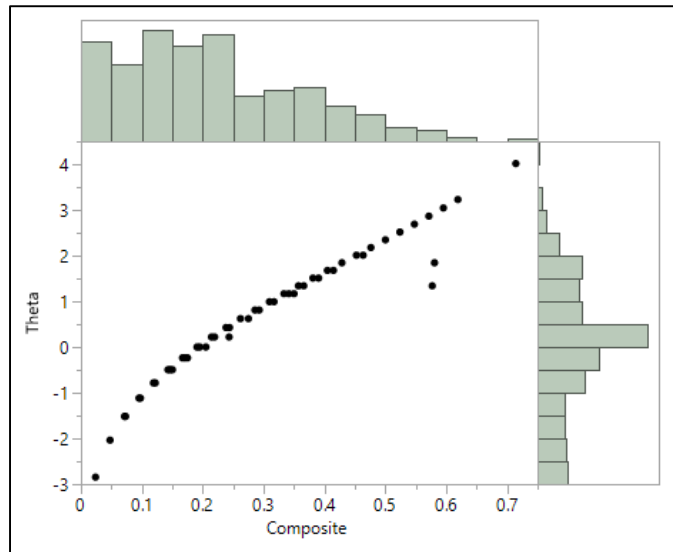


Figure 4: Scatterplot of Theta and Composite Scores with Histograms

Figure 4 shows the scatterplot of student theta scores and traditional composite scores with histograms at the X-axis and Y-axis. This data visualization reveals two issues of traditional composite scores. As shown in the scatterplot, for some students the severity of mental conditions was either over-estimated or under-estimated. The association between the theta and the composite scores is curvilinear, because the distribution of the composite scores is skewed towards lower scores, whereas that of theta is fairly normal. The distribution of the composite scores conveys a false sense of security because it seems that most students are concentrated toward the lower end. However, this contradicts the national data showing an alarming trend, as discussed earlier. Hence, the normal distribution of the theta scores is closer to the reality.

5.6 Descriptive Statistics and Data Visualization

Table 3: Descriptive Statistics of Church Attendance and Faith Status

Level	Number	Mean	Std. Error	Lower 95%	Upper 95%
I continue to attend church and have faith in Christ	310	-0.22	0.08	-0.37	-0.08
I still attend church but have serious doubts of my faith in Christ	25	0.84	0.27	0.32	1.36
I have not attended church for over one year but I maintain my faith in Christ	77	0.51	0.15	0.21	0.81

Level	Number	Mean	Std. Error	Lower 95%	Upper 95%
I am not attending church and have abandoned my faith in Christ	14	0.76	0.35	0.06	1.46

Table 3 summarizes the theta scores by church attendance and faith status. Scores above zero indicate more mental issues, and negative scores indicate the opposite. Figure 5 clearly shows that students who attend church and keep their faith active tend to be immunized against mental distress or disorder. It is important to point out that this is the only group that has a negative theta score. Those students who attend church but doubt their faith, and those who do not attend church and gave up their faith, face more problems in terms of mental wellbeing. Those students who do not attend church but keep their Christian faith are doing a bit better than the two previous groups in mental wellbeing, but not as good as the first group.

Demographic variables were utilized to explore whether the preceding protective effect was consistent across subgroups. Interestingly, as shown in Figure 6, female students had a similar pattern to the entire sample pertaining to the relationship between religion and mental health, probably because throughout the whole sample, female students were the majority (72.41%). However, a slightly different pattern was observed among male students. While more Group 1 male students benefitted from the protective effect than their female counterparts, for male students the second best group is “I have not attended church for over one year but I maintain my faith in Christ” (Group 3) while the worst is “I still attend church but have serious doubts of my faith in Christ” (Group 2).

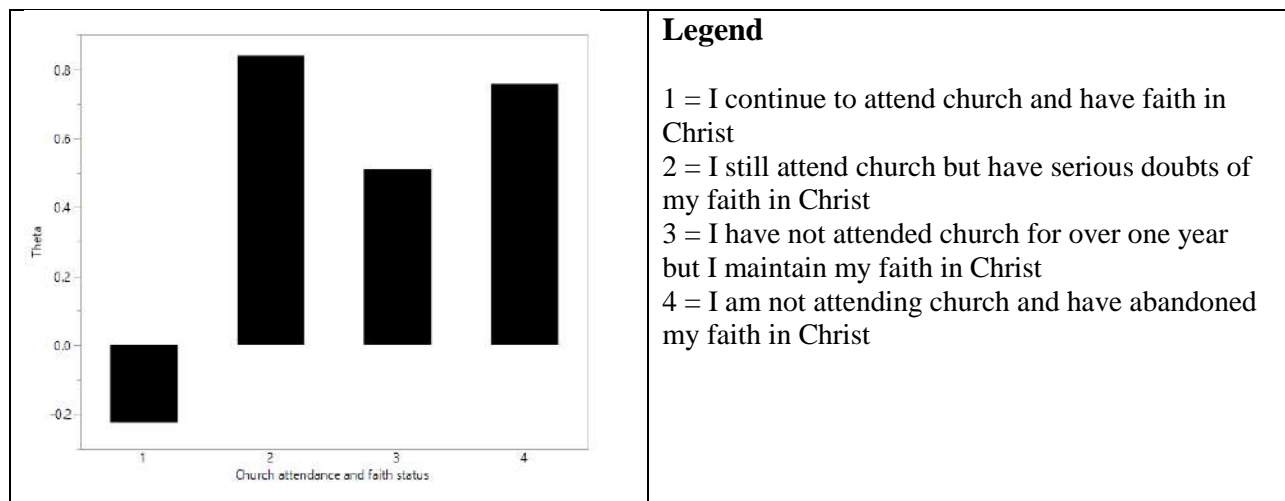


Figure 5: Average Theta by Church Attendance and Faith Status

The relationship between the Christian faith and mental health was further explored by using ethnicity as a moderating variable. It is noteworthy that among the biracial and the multi-racial group, students who continue to attend church and have faith in Christ (Group 1) obtained a positive theta score while all other racial groups (White, Black, Hispanic, Native, Asian, other) have an average negative theta in Group 1. Nevertheless, this positive theta score is still close to zero (see Figure 7).

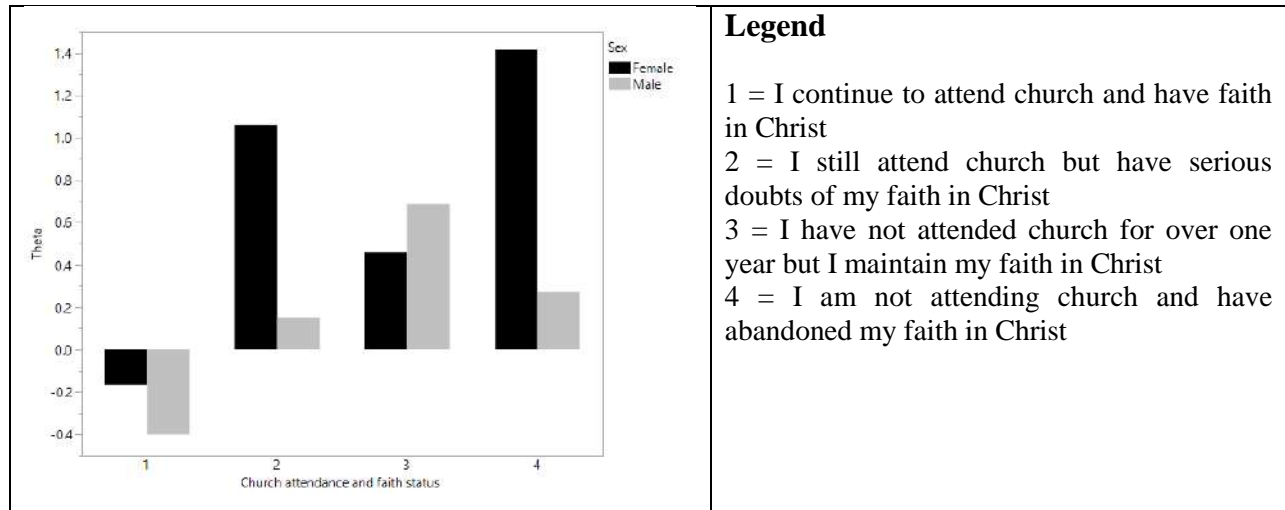


Figure 6: Average Theta by Church Attendance/Faith Status and Sex

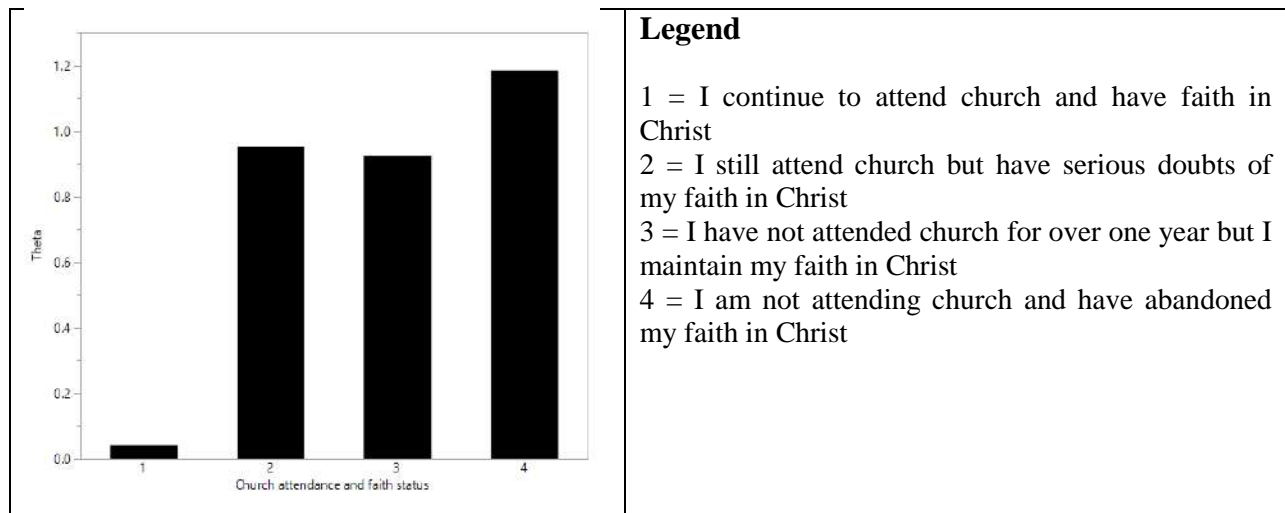


Figure 7: Average Theta by Church Attendance/Faith Status of Biracial and Multiracial Students

5.7 ANOVA and Multiple Comparisons

A one-way ANOVA using theta as the response variable and church attendance/faith status as the grouping factor yields a significant difference, $F(3, 422) = 11.61, p < .0001, ES =$

0.076. Multiple comparison by the Tukey test indicates that students who attend church and keep their faith active outperformed all three other groups in terms of mental wellbeing (see Table 4)

Table 4: Multiple Comparison

Group*	vs Group*	Difference	Std. Err Diff	Lower CL	Upper CL	p
2	1	1.06	0.28	0.359	1.78	0.0008
4	1	0.98	0.36	0.05	1.92	0.0354
3	1	0.74	0.17	0.30	1.17	<.0001
2	3	0.33	0.31	-0.46	1.12	0.7051
4	3	0.25	0.39	-0.75	1.24	0.9195
2	4	0.08	0.44	-1.06	1.23	0.9977

*

- 1 = I continue to attend church and have faith in Christ
- 2 = I still attend church but have serious doubts of my faith in Christ
- 3 = I have not attended church for over one year but I maintain my faith in Christ
- 4 = I am not attending church and have abandoned my faith in Christ

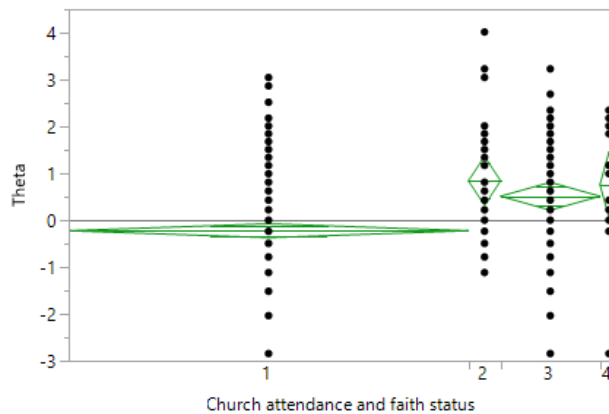


Figure 8: Diamond Plots Projecting the Population Means

Data visualization by diamond plots, as shown in Figure 8, confirms this finding. The line inside the diamond is the sample mean of the group, the height of the diamond is derived from the 95% confidence interval, meaning that the population mean might be as high as the upper bound of the diamond or as low as the lower bound. The width of the diamond symbolizes the sample size. Obviously, participants who continue to attend church and keep their faith outperformed all other groups.

6. Summary and Conclusion

6.1 Discussion

In alignment with prior research, this study further confirmed that there is a strong association between Christian faith and mental wellbeing. To be more specific, attending church and keeping faith resulted in the best mental wellbeing, whereas skipping church but keeping faith was associated with some mental health issues, as measured by IRT theta scores. However, attending church but doubting faith met almost the same results as leaving church and giving up faith together. Both groups suffer from more severe mental conditions. Although the results are slightly different when subsamples classified by gender and ethnicity were analyzed, the main conclusion remains unchanged: Christians who attend church and maintain faith outperformed all other groups in terms of mental health.

This study, however, reveals a forgotten population. Ex-Christians who are not attending church and have given up their faith, especially female students and biracial/multiracial students, are vulnerable to mental distress and disorder. While unchurching and deconversion have been studied by a number of researchers, the focus is mainly on factors contributing to their departure (Baker, 2015; Brown & Yu, 2017; Dyck, 2010; Hendricks, 1993; Kinnaman & Hawkins, 2011; McKnight & Ondrey, 2008; Packard & Hope, 2015; Vaidyanathan, 2011; Yu & Hui, 2014; Yu, Hui, Kriege, & Mather, 2016). However, at the present time the author is not aware of any major research project devoted to the impact of unchurching and deconversion on mental health among ex-Christians. This pressing research question awaits further investigation.

6.2 Research Limitations

There are several limitations in this study. First, although the overall sample size is adequate for running one-parameter IRT and ANOVA, and the data structure does not violate the parametric assumptions of the *F*-test, the group sizes are highly asymmetrical. To be specific, there are 310 students who reported regular church attendance and active faith and 77 students who reported skipping church but still maintaining faith. However, only 25 church-goers were doubtful of their faith and only 14 students had given up church and faith together. Based on the rule that the standard error is a function of the sample size, the inferences pertaining to the first two groups are more valid than those of the last two.

Sampling bias is another potential threat to both the internal validity and external validity of this study. These data were collected in a Christian university, and thus most participants were Christians or ex-Christians (including both Protestants and Catholics). In the literature review section CCMH data reveals that while students who declared the Judeo-Christian tradition as

their religious and spiritual preference tend to be robust against mental distress, this protection effect was not found among students favoring other religions, such as Buddhism and Hinduism. Unfortunately, in this Christian school where data were collected, very few students are affiliated with religions outside the Judeo-Christian heritage. When similar research is conducted in the future, the sampling pool should expand to non-Christian universities.

6.3 Scope of Future Research

Finally, at most statistical figures can show us what and how many, but cannot explain how and why. This survey research study is correlational in essence, and therefore the author does not intend to establish a causal link between the Christian religion and mental health. In the future it is desirable to utilize a concurrent embedded mixed-method design to collect both quantitative and qualitative data (Creswell & Plano Clark, 2007). By collecting open-ended responses through interviews and focus groups, more insight about the causal link between Christianity and mental health might be discovered.

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