



Poverty, Psychological Distress, and Suicidality Among Gay Men and Transgender Women Sex Workers During the Covid-19 Pandemic in Phuket, Thailand

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Abstract

Introduction Thai gay men and transgender women (GM&TGW) sex workers are more likely to suffer from economic harm since the sex tourism industry in Thailand has been hit hard by the Covid-19 pandemic. They also are more likely to experience poverty and mental health issues subsequent to the pandemic as minority groups in conservative Thai society. While their highly problematic social and economic situation would predict a wide range of psychological issues, little is known about their mental health. Hence, this study examined the prevalence and symptom severity of psychological distress among the group as well as the associations between suicidal ideation, poverty, and psychological distress.

Methods Two hundred seventy questionnaire responses were collected online via Google forms in Phuket in 2021. Data analysis was conducted using SPSS and Smart-PLS.

Results Based on the results, most respondents had experienced mild to extremely severe symptoms of psychological distress. However, transgender women sex workers scored higher on depression and anxiety compared to gay men sex workers. This study confirmed the prominent associations between the study variables and the mediation effect of psychological distress.

Conclusions Poverty resulting from the pandemic imposes a substantial human cost for this vulnerable minority beyond the virus itself as it amplifies mental health problems.

Policy Implications The findings further extend our awareness of the discriminatory treatment of Thai GM&TGW sex workers and address a gap in Thai law and policy for prohibiting discrimination against them. It is of urgent necessity for Thai public health and tourism policymakers to establish sound support interventions.

Keywords Gay men · Poverty · Psychological distress · Sex workers · Suicidal ideation · Transgender women · Travel restrictions

Introduction

Although Thailand is relatively open to LGBT people (lesbian, gay, bisexual, and transgender), persistent discrimination against Thai LGBT groups at all stages of employment directs them to accept jobs in the informal sector with less

job security and social protection (Suriyasarn, 2016). As the tourism demand has increased rapidly and boosted the growth of Thailand's tourism industry, many poor transgender women and gay men have moved and worked in the sex industry as their only feasible option (Davis et al., 2019; Ocha, 2020; Statham & Scuzzarello, 2021). Despite being illegal, the sex industry in Thailand employs about 200,000 to more than 1 million sex workers (Amendral, 2021, as cited in McKenzie et al., 2021), which is undoubtedly regarded to be a significant underestimation. Thailand's GDP amounted to 401.27 billion US dollars in 2015 (Statista, 2022) and the Havocscope's research report (2015) showed that the sex industry generated 6.4 billion US dollars in 2015, accounting for almost 1.6% of Thailand's total GDP. Sex work in Thailand not only boosts the economy but also is entwined with the tourism industry and promotes sex tourism. For example, in 2014, out of a total of 26.74 million tourists, 11.23 million were estimated by

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NGOs to be foreign men who came to Thailand specifically to purchase sexual services (Lines, 2015). The workforce of the Thai sex trade, in particular, has disproportionately many ethnic minority individuals who have no Thai ID (Janyam et al., 2020) and Thai migrants from villages who use the income from sex work to support families in their home communities (Joint United Nations Programme on HIV/AIDS, 2014). However, sex workers in Thailand are not only cisgender women. Many of them are men or transgender women too (Davis et al., 2019; Napatanapong & Saowakhon, 2022; Ocha, 2013, 2020; Statham & Scuzzarello, 2021).

In addition to Thai heterosexual women/men sex workers, transgender women and gay men are sex work service providers to foreigners (Davis et al., 2019; Ocha, 2020; Statham & Scuzzarello, 2021). Based on an estimate from LGBT Capital, 4.2 million LGBT people were living in Thailand in 2018 (Angkulanon, 2018). Yet, there is a lack of research and aggregate data on the number of LGBT individuals who work in the sex industry. In comparison, Thai transgender women are often the most identifiable group who face more difficulties finding other employment, as Thai society like any other society does not openly accept transgender women (Ojanen et al., 2019). They have become a significant tourist attraction in Thailand and constitute a growing market of sex tourism specifically focused on transgender women sex workers in Phuket and Bangkok (Gallagher, 2005). Although transgender women sex workers account for a significant proportion of total sex labor in the country, they do not even benefit the same from some limited opportunities and privileges as heterosexual women/men sex workers do, such as Thai society's greater sympathy for heterosexual sex workers and more amenable acceptance of them in other workplaces (Laikram & Pathak, 2021). Moreover, Thailand's reputation for sex tourism catering for the sexual tastes of heterosexual men tourists has changed to a further diversification of sex tourism destination due to an increasing number of male sex workers (Ocha, 2013), which makes the country seem like a paradise for foreign gay tourists (Mahavongtrakul, 2018).

However, the Covid-19 pandemic has severely disrupted the tourism-dependent economy in Thailand where the tourism industry generates one in six jobs (Pinchuck, 2020) and accounts for approximately 21.6% of the GDP (World Travel & Tourism Council, 2019). Due to travel bans and the closures of entertainment venues to international tourists, hundreds of thousands of sex workers became jobless (Promchertchoo, 2021). This situation raises questions on the financial situations faced by Thai sexual and gender minorities, such as gay men and transgender women (GM&TGW). These people often earn their incomes through partnering with foreign men in tourist zones (Statham, 2020; Statham & Scuzzarello, 2021) and this could have been affected by the fall of international tourist

arrivals. What makes the situation worse is that sex work is criminalized (Napatanapong & Saowakhon, 2022; National Monitoring and Evaluation Unit Bureau of AIDS, TB, and STIs, 2018). As a result, sex workers are among the most vulnerable groups affected by the Covid-19 pandemic, as they are not eligible to access the Thai government's financial assistance (Janyam et al., 2020). The consequence of the socioeconomic inequality and denial of sex workers' human rights made transgender women sex workers to be physically, mentally, and financially most adversely affected by the Covid-19 pandemic among the sex workers as they experienced more sexual abuse and social exclusion, and also fewer clients (Laikram & Pathak, 2021).

Therefore, Thai GM&TGW sex workers who lost their jobs due to the Covid-19 pandemic are currently at particular risk of long-term financial impacts of the crisis caused by the catastrophic collapse in Thailand tourism, with no access to social, financial, and psychological support (Burton, 2020). Thai GM&TGW who work in the sex tourism industry in Thailand were left to fend for themselves like any other sex workers (Laikram & Pathak, 2021). This situation is likely to have significant personal costs, including the onset or worsening of their mental health issues (National Ugly Mugs, 2020). In fact, as a result of Covid-19, the economy was disrupted and livelihoods were lost across the country, with concerns about the effects this has had on mental health and suicidality, especially among vulnerable populations such as GM&TGW sex worker groups. A study conducted by Chang et al. (2013) on the impact of the 2008 "Great Recession" demonstrated a sharp increase in the numbers of suicide mortality across Europe and the USA. These effects may be particularly significant in GM&TGW populations experiencing higher suicide rates compared to cisgender women and heterosexual men (Caputi et al., 2017; Haas et al., 2011, 2014; King et al., 2008; Plöderl et al., 2013; Price-Feeney et al., 2020) and higher risk of committing suicide during the pandemic, most specifically among transgender individuals (Shoib et al., 2022). Yet, no published research in Thailand has investigated the mental well-being of the population who are more likely to experience psychological distress and suicidal ideation arising from poverty, inequality, and isolation due to the Covid-19 pandemic. However, the argument developed throughout this study highlights the necessity of examining some alternative hypotheses about how poverty rising and intensified by the Covid-19 pandemic influences the experiences of psychological distress and suicidal ideation among Thai GM&TGW sex workers in Thailand.

LGBT in Thailand

Known as "The Land of Smiles," Thailand has been perceived as an LGBT-friendly destination where people seem

to have a higher level of acceptance towards the LGBT community, and transgender people can state explicitly their identities (Davis et al., 2019). In terms of the legal rights of the LGBT community, Thailand has been relatively progressive and dynamic compared to other Southeast Asian countries. According to a report jointly published in 2018 by the United Nations Development Programme (UNDP) and Ministry of Social Development and Human Security (MSDHS), Thailand is the first country in the region that enacted a national law, namely the Gender Equality Act, which provides anti-discrimination protection in various contexts (e.g., workplace, education, social welfare provision, and exemption from military service) for people whose gender identity or expression does not match their sex assigned at birth. In 2020, the Thai government endorsed a civil partnership bill that would enable same-sex couples to register their partnership (Tanakasempipat, 2020). However, as of 2022, it is still uncertain whether a law corresponding to the bill will eventually be enacted. If this bill passed into law, it would be perceived as progressive movement and will lay the foundation for Thailand to potentially become the first Southeast Asian country to legalize same-sex civil partnerships.

However, the status quo of the LGBT community in Thailand is complicated and discrimination is commonplace in many contexts. In reality, while Thailand strives to promote its LGBT-friendly image, the LGBT community is still facing stigmatization and pressure to adhere to mainstream social norms (World Bank Group, 2018). Moreover, LGBT people in the labor market are still being discriminated against for a variety of reasons, such as gender identity, sexual orientation, HIV status, and being sex workers (Suriyasarn, 2016). According to the reports published by the UNDP and United States Agency for International Development (USAID) as well as the World Bank Group, transgender people whose identities can be easily recognized encounter the most discrimination in Thai society (UNDP & USAID, 2014; World Bank Group, 2018).

Psychological Distress and Suicidal Ideation

Drawing on the previous section, Thai LGBT populations may be more likely to experience psychological distress due to stigma, discrimination, and isolation for being a minority group in conservative Thai society. Psychological distress refers to symptoms of depression, anxiety, and stress, with high symptom severity of these three factors indicating poor mental health (Cuijpers et al., 2009). When compared with the general population, LGBT people have higher rates of psychological distress (Borgogna et al., 2019; Semlyen et al., 2016). Despite the extremely little research attention directed to understanding psychological distress among Thai LGBT people, some exceptional works have found a clinically remarkable level of stress (60%) and depression (40%)

among the Thai LGBT population (Kittiteerasack et al., 2020). These findings are consistent with an earlier study in Thailand (Pearkao, 2013) indicating that 70% of Thai transgender women and gay men respondents are suffering from high levels of stress. Although depression was less prevalent than stress among Pearkao's participants, Thai gay men showed higher levels of depression than transgender women. Furthermore, the study conducted by Yadegarfar et al. (2014) revealed that Thai transgender women experienced a higher level of depression compared to cisgender men respondents. Kittiteerasack et al. (2021) examined the rates and predictors of suicidality (suicidal ideation and suicide attempts) among Thai LGBT persons; the majority of respondents were gay men (79.3%). The study indicated that 57.4% of the respondents suffered from clinically significant levels of stress and 39.2% of them reported suicidality as well. The work of Guadamuz et al. (2019) revealed that the higher prevalence of illicit substance use among Thai sexual and gender minority (SGM) adolescents compared to non-SGM groups was also associated with suicidal ideation and depressive symptoms.

The Covid-19 pandemic that broke out in late 2019 severely affected the mental health of LGBT populations. This is especially evident in the extant research carried out in the USA (Gonzales et al., 2020; Moore et al., 2021; Salerno et al., 2020). The survey conducted by UNDP Thailand and the Asia Pacific Transgender Network (APTNet) in April 2020 reported how Thai LGBT individuals were suffering from increased feelings of loneliness, stress, and depression due to the Covid-19 pandemic (UNDP Thailand, 2020). However, transgender persons (Scandurra et al., 2017; Valentine & Shipherd, 2018; Wanta et al., 2019) and gay men (Cohen et al., 2016; King et al., 2008; Medley et al., 2016; Michaels et al., 2016) had higher rates of psychological distress than cisgender and heterosexual individuals even before the Covid-19 pandemic. For example, gay adults are more than twice as likely as heterosexual adults (Medley et al., 2016) and transgender individuals are nearly four times as likely as cisgender adults (Wanta et al., 2019) to experience mental health conditions, most specifically depression and anxiety disorders. Furthermore, recent studies demonstrated that the Covid-19 pandemic significantly increased psychological distress among gay men (Holloway et al., 2021) and transgender women (Kidd et al., 2021).

Transgender and gay individuals are also at a higher risk of suicidal ideation and attempts (Caputi et al., 2017; Haas et al., 2011, 2014; King et al., 2008; Plöderl et al., 2013; Price-Feeney et al., 2020). Gay men are at over four times (King et al., 2008) or six times the risk of lifetime suicide attempts (Haas et al., 2011) and transgender populations are at even greater risks of lifetime suicide attempts compared to heterosexual or cisgender people, respectively (Haas et al., 2014). Furthermore, research has demonstrated

a high prevalence of suicidal ideation and attempts among GM&TGW sex workers (Burnette et al., 2008; Chakrapani et al., 2007; Marshall et al., 2016). However, GM&TGW sex workers are not inherently more likely to develop suicidal behavior and mental health issues. Rather, the increased risk of suicidal behaviors and psychological distress factors, including depression, anxiety, and stress stems from the stress associated with continued exposure to LGBT-specific stressors, such as stigma, social isolation, and discrimination (Meyer & Frost, 2013). According to the minority stress theory (MST; Meyer, 2003), the higher occurrence of psychological problems among LGBT people is caused by either internal stressors, such as the negative thoughts and emotions they have as a result of their identity (i.e., internalized homophobia) or external stressors like a “hostile and stressful social environment” (2003, p. 674). Thus, it is likely that the perceived stigma, isolation, and discrimination that GM&TGW individuals experience either as members of LGBT groups (Kelleher, 2009) or sex workers’ community (Burnette et al., 2008) contributes to psychological distress and suicidal behavior. Research has showed how psychological distress, such as depression (Baams et al., 2015; Dejun et al., 2016; Price-Feeney et al., 2020; Sopitarchasak et al., 2017), anxiety (Cochran et al., 2003; Haas et al., 2011), and stress (Kittiteerasack et al., 2021), have consistently been among the strongest predictors of suicidal ideation among LGBT communities. Based on the above discussion, this study frames the following hypothesis:

H1: There is a significant relationship between psychological distress and suicidal ideation among gay men and transgender women sex workers.

Poverty, Psychological Distress, and Suicidal Ideation

Apart from minority stressors, MST assumes that LGBT people are also burdened by the general stressors, such as poverty and unemployment, that may generally be experienced by all members of society. While financial hardship as a general stressor is pretty common among LGBT individuals (DeFilippis, 2016; Díaz et al., 2001; Waite & Denier, 2015), the specific application of MST to understand the underlining mechanism in which poverty contributes to mental health problems among minority communities, especially transgender people, is not clear enough. This is due to the inability of MST to explicitly investigate the “common vulnerabilities in psychological and social processes” that are experienced by both cisgender and non-cisgender people (Hatzenbuehler, 2009, p. 712). Furthermore, MST was originally designed only for sexual minorities (lesbian, gay, and bisexual), whereas gender minorities (trans and nonbinary people) have specific stressors that were not included in the original MST model (Tan et al., 2020).

At a broader level, the strain theory of suicide (STS) suggests that deprivation strain, including poverty, as one of the four sources of strain (deprivation strain, value strain, aspiration strain, and coping strain) leads to suicidal ideation and attempts (Zhang & Lester, 2008). According to STS, once a person with one of those aforementioned strains is unable to deal with the strain, he/she would feel anger and the inward release of anger pressure may result in depression, anxiety, stress, and finally suicidal ideation (Zhang, 2019). It is also supported by the research indicating that poverty may act as a particular risk factor for increased psychological distress (Kinitz et al., 2022; Ross et al., 2018; Steele et al., 2017) and the high tendency of committing suicide among transgender and gay people (James et al., 2016; Kittiteerasack et al., 2021). In light of the above discussion, we can conclude that aside from poverty’s direct effect on psychological distress and suicidal ideation, the function of poverty in forecasting suicidal ideation may be more complicated than the original MST stated. At this point, offering a mediation model, drawing from MST (Meyer, 2003) and STS (Zhang & Lester, 2008), may help to understand how poverty subsequent to the onset of Covid-19 results in a higher occurrence of psychological distress and suicidal ideation in GM&TGW sex workers. As such, this study hypothesizes:

H2: There is a significant relationship between poverty and suicidal ideation among gay men and transgender women sex workers.

H3: There is a significant relationship between poverty and psychological distress among gay men and transgender women sex workers.

H4: Psychological distress mediates the relationship between poverty and suicidal ideation among gay men and transgender women sex workers.

Moreover, the minority stress theory indicates that LGBT mental health difficulties are largely due to chronic exposure to stigma and discrimination in their social communities that gives rise to stressors and stress processes as the main contributing factors to psychological distress (Meyer, 2003). It can be concluded that the Covid-19 pandemic and subsequent Thai GM&TGW sex workers’ poverty may act as strong stressors causing psychological distress. Yet, poverty can be differently experienced by people with various sexual orientations and gender identities. For example, a survey conducted by the World Bank Group (2018) reported that 60.1% and 15.8% of Thai transgender women respondents had experienced more discrimination and exclusion in finding a job and accessing financial services, respectively, compared to Thai gay men (18.9% and 9%, respectively) even before the Covid-19-pandemic. Furthermore, Tan et al.’s study (2020) provides a critical review developed upon past theories on gender minority stressors. They reveal that there are specific forms of minority stressors unique to transgender persons, such as non-affirmation and nondisclosure

of gender identity that largely contribute to their minority stress experiences. The study also clarifies that these specific stressors manifest high psychological distress levels among transgender persons compared to their cisgender counterparts. However, transgender women face the worst discrimination in Thailand, which may correlate with their high visibility in society leading to disparities in mental health problems (UNDP & USAID, 2014). Therefore, we can claim that Thai GM&TGW sex workers are disproportionately impacted by psychological distress. Accordingly,

H5: There is a significant difference in the prevalence of psychological distress among gay men and transgender women sex workers.

Methods

Participants and Procedures

The required sample size was computed as a function of the desired statistical power for the specified alpha value and hypothesized effect size as suggested by Cohen (1988). An application of G*power gave us a sample size of 110 ($f^2=0.10$, $\alpha=0.05$, and statistical power=0.95, number of predictors=2). However, this study targets sex workers that are an unknown population, and a sample of 384 is representative of an unknown population (Thompson, 2012). Hence, the authors expected a sample size of 110 to 384 as suggested by Cohen (1988) and Thompson (2012).

Due to the Covid-19 outbreak, the snowball sampling strategy was chosen and the link of an anonymous Google form survey was shared among Thai LGBT people (e.g., Andaman Power Group, the main LGBT group in Phuket) through different social media platforms (Facebook, Line, WhatsApp) in Phuket. Phuket is the largest island and the second most popular international tourist destination in Thailand, which not only enjoys the reputation of UNESCO City of Gastronomy with its delicious local street food but also offers extraordinary seaside experiences (Sangkaew & Zhu, 2022; Yasami et al., 2021; Zhu & Yasami, 2021, 2022). The eligibility criteria included any individuals who are of Thai nationality, over 18 years old, self-identify as gay men or transgender women, and work in the Phuket sex tourism industry before and during the Covid-19 pandemic. An obvious advantage of an online survey was the ability to reach specific hidden populations, such as sex workers (Raina, 2017), its anonymity reduces social desirability response, obtains more truthful answers, and saves the researchers' time and effort (Wright, 2005). Ethical approval was granted by Taylor's University's Human Ethics Committee (Reference No.: HEC 2021/112). The data were collected over a period of 20 days between 20 July and 9 August 2021. At the time of data collection, Thailand was in the midst of

the third wave of the Covid-19 outbreak, and all bars, pubs, nightclubs, and other entertainment venues had been closed in Phuket.

In the cover letter of the online survey, the respondents were requested to read the consent agreement carefully before they decided to participate in this study. The informed consent agreement illustrated the purpose of the study, the time required to fill out the form, the anticipated risks of participating in the study, and the confidentiality of the data. Moreover, it kindly informed the potential participants that their participation in the study was completely voluntary and they had the right to withdraw from the study at any time without consequence. All participants were required to check the agreement box in the final section of the informed consent agreement, indicating they had read the procedure described and voluntarily agreed to participate in the research. However, by the cut-off date for data collection, 270 completed questionnaires were returned, yielding a response rate of 70.31% of the original sample.

Survey Instrument

In this study, the 21-item Depression, Anxiety, and Stress Scale (DASS 21) established by Lovibond and Lovibond (1995) was adopted to assess psychological distress. The DASS 21 is very sensitive to differentiating anxiety from depression (Beuke et al., 2003). Respondents rated the extent to which they had experienced the 21 symptoms listed in the questionnaire because of the Covid-19 pandemic over the past week (e.g., "I felt that I had nothing to look forward to," "I felt afraid for no reason," "I found myself getting agitated"). The items of depression, anxiety, and stress (seven items each) were scored on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much). The scores for these components were summed ranging from 0 to 21 for each. The severity labels were assigned based on Lovibond and Lovibond's (1995) standard cut-off scores.

The 10-item Suicidal Ideation Scale (SIS; Rudd, 1989) was recruited to evaluate the existence or nonexistence of suicidal thinking as well as the strength of those ideas during the past 12 months (e.g., "I have been thinking of ways to kill myself," "I have told someone I want to kill myself"). The respondents were required to rate their responses for the 10-item SIS using a 4-point Likert scale ranging from 0 (never) to 3 (many times). The SIS enjoys a high internal consistency (Cronbach's $\alpha=0.86$) and appropriate item-total correlations ($r_s=0.45$ to 0.74 ; Rudd, 1989). Cronbach's α in the study sample was 0.98. Recent experiences of poverty were measured by three items adopted from Díaz et al. (2001). The respondents rated the extent to which they had experienced poverty/financial hardship over the last 12 months (e.g., "In the last 12 months, how often did

Table 1 Collinearity assessment

Variables ^a	Tolerance	VIF
Depression	0.723	1.384
Anxiety	0.695	1.438
Stress	0.692	1.444
Poverty	0.9	1.111

^aDependent variable: suicidal ideation

you run out of money for your basic necessities?” “In the last 12 months, how often have you had to borrow money from a friend or a relative to get by financially?”). Ratings of a three-item scale were made on the same 4-point from 0 (never) to 3 (many times).

The questionnaire also included some background variables such as gender identity, age, sexual identity, educational attainment, living status (living alone, with family, with a partner, with friends, or others), receiving economy-oriented psychological support during the pandemic until the time of data collection, job loss, and having been diagnosed with a chronic disease to profile the respondents. Chronic diseases were assessed by the 12 items from the Chronic Disease Score (Von Korff et al., 1992) plus a single item asking about the history of HIV from the National Cancer Institute Morbidity Index (Klabunde et al., 2007). The original version of each scale was in English. After a complete revision according to the comments of a panel of experts from the psychology and tourism disciplines, the questionnaire was translated into Thai by a Thai-English translator. Later, it was back-translated to English by two professional English-Thai translators. No discrepancies were detected once the back-translated version was compared to the original questionnaire. The DASS-21 scale was an exception to this questionnaire as we used the available validated Thai version of the scale (Phativarakorn, 2015). A pre-test was performed by 15 Thai GM&TGW sex workers to ensure the survey questions are easy to read and understand.

Data Analysis

Data cleaning, testing the normality of the data, descriptive statistics, common method bias, and hypothesis tests were

conducted using SPSS 26.0 and Smart-PLS 3.0. No outliers were detected. To check common method bias/variance (CMV) in the data, exploratory factor analysis demonstrated that a single factor explained only 30.09% out of the total variance (60.54%), which was less than 50% indicating no issue of CMV in the data set (Podsakoff et al., 2012). As shown in Tables 1 and 2, no multicollinearity issues exist among the variables since variance inflation factor (VIF) values were below the threshold of 5.0, tolerance values were higher than 0.20, and the maximum correlation between variables was 0.481 (Hair et al., 2014). Besides descriptive statistics, including frequencies and percentages generated for categorical variables, means and standard deviations for continuous variables, and prevalence and symptom severity rating for psychological distress factors, the *t*-test was employed to compare depression, anxiety, and stress mean scores among Thai GM&TGW sex workers. For testing the mediating effect of poverty, partial least squares-structural equation modeling (PLS-SEM) was employed. It is suitable for predictive research examining mediating effects if some constructs have a maximum indicator of three (Hair et al., 2017).

Results

As shown in Table 3, over half of the respondents had graduated from a high school (52.7%). Young adults (18 to 37) made up the highest percentage of the sample (81.5%). The age groups of 38–47 and 48–57 represent 16.7% and 1.8% of the total respondents, respectively. Most respondents were living with their friends (70.37%). A total of 64.8% of the respondents were transgender women. Only 2.2% of the respondents received economy-oriented psychological support during the pandemic. In terms of job losses due to the pandemic, a total of 97.4% of the respondents lost their jobs. The vast majority of them had no history of any chronic diseases (76.7%). 25.6% of the respondents were HIV-positive, of which, the majority were transgender women (22.6%).

Scores on the DASS-21 were calculated for depression, anxiety, and stress subscales by summing the scores for each and multiplying by two (Caetano et al., 2017; Lovibond &

Table 2 Mean, standard deviation, and bivariate correlation ($n = 270$)

Construct	Mean	SD	1	2	3	4	5
1- Depression	1.965	1.031	1				
2- Anxiety	1.409	0.947	.424**	1			
3- Stress	1.768	0.895	.454**	.481**	1		
4- Poverty	1.753	0.941	.258**	.273**	.191**	1	
5- Suicidal Ideation	2.108	0.762	.380**	.384**	.382**	.290**	1

**Correlation is significant at the 0.01 level (2-tailed)

Table 3 Respondent profile ($n = 270$)

Variable	Number	Percentage
Age		
18–27 years old	51	18.9
28–37 years old	169	62.6
38–47 years old	45	16.7
48–57 years old	5	1.8
Identity Group		
Gay men	95	35.2
Transgender women	175	64.8
Education		
Elementary school	88	11.4
Up to high school	182	52.7
Living status		
Living alone	34	12.6
With partner	46	17.03
With friends	190	70.37
Receiving economy-oriented psychological support during the pandemic		
Received	6	2.2
Not received	264	97.8
Job status		
Lost their jobs	263	97.4
Still working	7	2.6
Chronic disease status		
Yes	63	23.3
No	207	76.7
HIV Positive		
Yes	69	25.6
No	201	74.4

Lovibond, 1995; Ronk et al., 2013). Based on the categorization of Lovibond and Lovibond (1995), the majority of the respondents had experienced mild to extremely severe symptoms of depression (86.7%), anxiety (80%), and stress (71.5%). 58.5% of the respondents had displayed severe to extremely severe symptoms of depression, 55.2% anxiety, and 46.3% stress (see Table 4).

Measurement Model

A two-step procedure was applied to evaluate the convergent validity and discriminant validity of the measurement model as suggested by Henseler et al. (2015). Four main statistical criteria are required to be satisfied for convergent validity (Hair et al., 2014; Henseler et al., 2015), including (1) factor loadings of all indicators within a construct should be higher than 0.708; (2) construct's composite reliability (CR) should be higher than 0.7; (3) average variance extracted (AVE) of the constructs should be beyond 0.5; and (4) Cronbach's alpha of the constructs should be higher

Table 4 Prevalence and symptom severity rating of psychological distress factors

Variable ($n = 281$)	Symptom severity score rating	Frequency (%)
Depression		
Normal	0–9	24 (8.9)
Mild	10–13	36 (13.3)
Moderate	14–20	52 (19.3)
Severe	21–27	24 (8.9)
Extremely severe	28+	134 (49.6)
Anxiety		
Normal	0–7	54 (20)
Mild	8–9	19 (7)
Moderate	10–14	48 (17.8)
Severe	15–19	21 (7.8)
Extremely severe	20+	128 (47.4)
Stress		
Normal	0–14	77 (28.5)
Mild	15–18	19 (7)
Moderate	19–25	49 (18.2)
Severe	26–33	34 (12.6)
Extremely severe	34+	91 (33.7)

than 0.7. By removing an indicator of suicidal ideation construct (SI10) due to the low factor loading, the measurement model met the aforementioned criteria supporting convergent validity (see Table 5 and Fig. 1).

Discriminant validity was evaluated by assessing the Heterotrait-Monotrait (HTMT) ratio criterion. The recommended values for HTMT (see Table 6) were lower than 0.85 (Henseler et al., 2015), indicating that all latent variables met the criteria for discriminant validity.

Establishing the Second-order Construct

Psychological distress in this study was considered a higher-order reflective construct. Table 7 illustrates how the reliability and validity of the psychological distress construct satisfied the cut-off points of AVE (0.639), Cronbach's alpha (0.717), and CR (0.841). According to the approach suggested by Hair et al. (2020), discriminant validity for the measurement model including a higher-order construct of psychological distress and two first-order constructs of poverty and suicidal ideation was ensured by evaluating the HTMT ratio criterion (see Table 8 and Fig. 2).

To evaluate the significant contribution of first-order variables of depression, anxiety, and stress to the second-order construct of psychological distress, bootstrapping approach was conducted to assess the significance of the standardized path coefficient (factor loadings) (Hair et al., 2020). The results indicated that depression ($\beta = 0.789$, $p = < 0.001$),

Table 5 The results of convergent validity of the measurement model

Construct	Item	Loadings	α	CR	AVE
Depression			0.931	0.934	0.708
	DP1	0.877			
	DP2	0.803			
	DP3	0.854			
	DP4	0.861			
	DP5	0.791			
	DP6	0.837			
Anxiety			0.924	0.939	0.687
	AX1	0.802			
	AX2	0.803			
	AX3	0.765			
	AX4	0.827			
	AX5	0.835			
	AX6	0.875			
Stress			0.928	0.932	0.699
	ST1	0.849			
	ST2	0.818			
	ST3	0.863			
	ST4	0.841			
	ST5	0.875			
	ST6	0.841			
Poverty			0.747	0.851	0.656
	PV1	0.831			
	PV2	0.866			
Suicidal Ideation			0.922	0.935	0.615
	SI1	0.702			
	SI2	0.810			
	SI3	0.724			
	SI4	0.849			
	SI5	0.853			
	SI6	0.823			
	SI7	0.804			
	SI8	0.734			
SI9	0.746				

α Cronbach's alpha, CR composite reliability, AVE average variance extracted

anxiety ($\beta=0.795$, $p < 0.001$), and stress ($\beta=0.818$, $p < 0.001$) had a factor loading above 0.7, while depression had the lowest and stress contributed the most to psychological distress (see Table 9).

As shown in Table 10, the standardized root mean residual value (SRMR) was 0.077, lower than 0.08, indicating a good model fit (Hair et al., 2017). Cross-validated redundancies or Q2 values specifying a higher predictive

accuracy of the structural model were greater than zero with the small predictive relevance of the path model as suggested by Hair et al. (2019). The coefficient of determination (R^2) of 0.103 and 0.269 indicated that the exogenous variables have small to large effects on the endogenous variables, respectively (Cohen, 1988).

Structural Model

This study ran a consistent bootstrapping with 5000 iterations of a reflective measurement model to test the study hypotheses (Dijkstra & Henseler, 2015). Regarding direct effects, the first three hypotheses were supported with $p < 0.001$ and $p < 0.005$ (see Table 11). Although the effect size value (f^2) is redundant to the size of the path coefficients and unnecessary to report (Hair et al., 2019), the values of 0.02, 0.15, and 0.35 can be viewed as a gauge for whether a predictor latent variable has a small, medium, or large influence at the structural level (Cohen, 1992). As demonstrated in Table 12, the exogenous variables of psychological distress and poverty have a medium to small size effect on the endogenous variable of suicidal ideation, respectively. With regard to the endogenous variable of psychological distress, it can be seen that poverty has a small effect size on psychological distress.

Hair et al. (2021) suggested a specific approach for mediation analysis, which is a description of the Zhao et al. (2010) procedure. Following the approach, to examine the mediating effect of psychological distress, the total, direct, and indirect effects were tested (Table 13). The results shown in Table 13 confirm the complementary mediation effect of psychological distress on the relationship between poverty and suicidal ideation as both indirect ($p1 \cdot p2$) and direct effects ($p3$) are positively significant displaying the same direction. However, Zhao et al.'s (2010) complementary mediation almost matches Baron and Kenny's (1986) concept of partial mediation (Hair et al., 2021).

To scrutinize the assumption of normality, the value of skewness and kurtosis, box plots, and normal and detrended Q-Q plots of depression, anxiety, and depression were applied for each category group alone. Those techniques revealed no dispersed data from a normal distribution. The assumption of homogeneity of variances was tested and found tenable using Levene's test. However, the results of t -test presented in Table 14 show the significant mean differences in perceived depression ($t = 2.528$, $p = 0.012$) and anxiety ($t = 4.183$, $p < 0.001$) among Thai GM&TGW sex workers. The results reveal that Thai transgender women sex workers scored higher in depression and anxiety compared to Thai gay men sex workers.

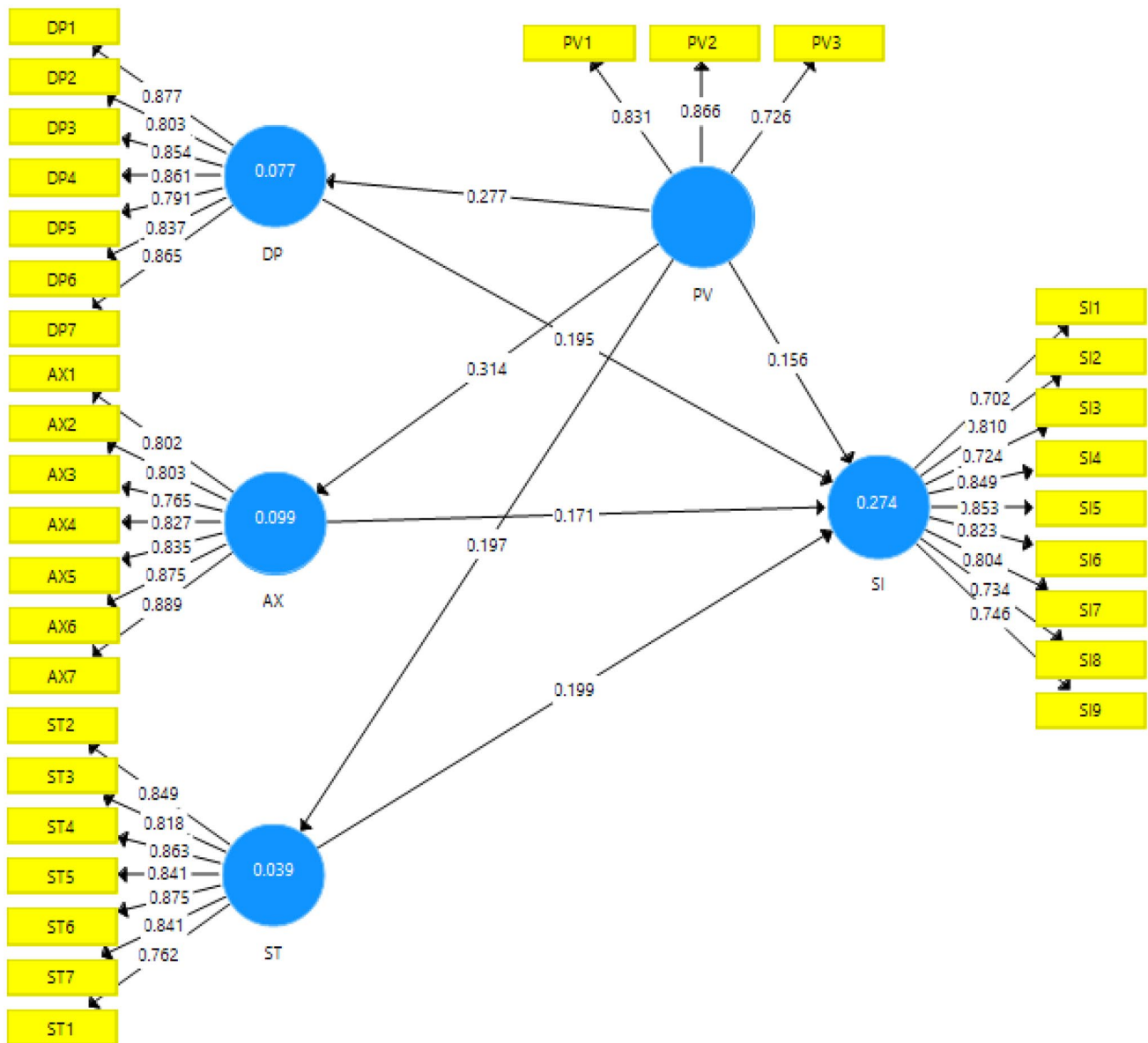


Fig. 1 Measurement model

Discussion

This study first examined the prevalence and symptom severity rating of psychological distress factors (depression,

anxiety, and stress) subsequent to the Covid-19 pandemic and their changes among Thai GM&TGW sex workers in Thailand. The main findings were that all factors of psychological distress were significantly high among Thai GM&TGW sex workers. The results are in line with recent studies suggesting that the Covid-19 pandemic has significantly influenced the worsening of psychological distress among transgender women and gay men (Holloway et al.,

Table 6 Heterotrait–monotrait (HTMT) ratio criterion

Variables	1	2	3	4	5
1- Anxiety					
2- Depression	0.459				
3- Poverty	0.330	0.313			
4- Suicidal Ideation	0.415	0.410	0.351		
5- Stress	0.520	0.491	0.233	0.416	

Table 7 Higher-order construct reliability and construct validity

	α	CR	AVE
Psychological distress	0.717	0.841	0.639

Table 8 HTMT higher-order construct discriminant validity

	1	2	3
1- Psychological distress			
2- Poverty	0.418		
3- Suicidal ideation	0.595	0.351	

2021; Kidd et al., 2021). These findings are also consistent with previous research in the Thai context indicating high levels of depression, anxiety, and stress among LGBT people (Guadamuz et al., 2019; Kittiteerasack et al., 2020, 2021).

According to the study results, Thai transgender women sex workers scored higher in depression and anxiety compared to Thai gay men sex workers. This contradicts Pearkao’s study (2013) showing that Thai gay men suffered from higher levels of depression than transgender women, but corresponds to the study by Yadegarfar et al. (2014) showing that Thai transgender women endure high levels of depression compared to cisgender men. However, it should be pointed out in the Yadegarfar et al.’s study, the comparison group may have differed from the trans women respondents as the cisgender men were students from an expensive private university, compared to the trans women, who were community members recruited from Rainbow Sky. Overall, in Thailand, comparable data is not available regarding psychological distress factors among Thai heterosexual men and cisgender women sex workers pre- and post-Covid-19 pandemic era. However, when compared to other contexts, studies reported that heterosexual men sex workers experienced a lower rate (Santos et al., 2021) to no psychological distress (Pereira, 2021) during the Covid-19 pandemic.

The high symptom severity of psychological factors among the study respondents raises a red flag and calls for considerable clinical attention. Needless to say, Thai GM&TGW sex workers were impacted uniquely during the

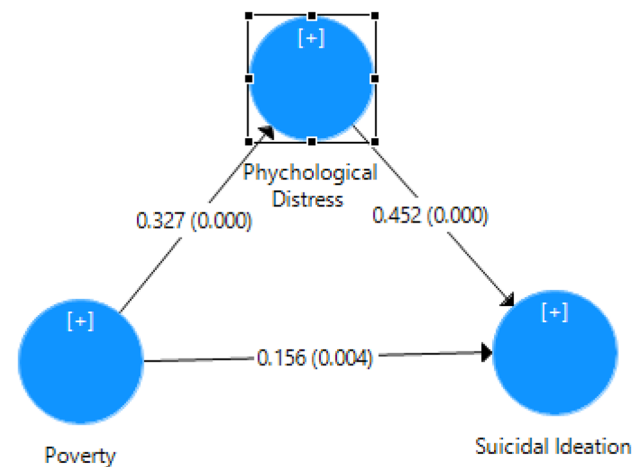


Fig. 2 Structural model

Table 9 Test of higher order model using bootstrapping

	Outer loading	SE	T values	P values
DF—> DP	0.789	0.029	27.185	<0.001
DF—> AX	0.795	0.03	26.146	<0.001
DF—> ST	0.818	0.026	31.386	<0.001

Covid-19 pandemic. The Thailand border closure in March 2020 due to the onset of the Covid-19 pandemic resulted in the largest absolute decrease in international tourist arrivals to Phuket; therefore, many Thai GM&TGW sex workers have lost their jobs with no access to social, financial, and psychological support (Burton, 2020). Besides exposure to LGBT-specific stressors, Thai GM&TGW sex workers like other sex workers in Thailand were compelled to deal with the persistent problems associated with their unclear legal status as well as the unparalleled experience of home quarantine, physical abuse, poverty, and career uncertainty (Laikram & Pathak, 2021) creating multifaceted impacts on their mental health.

The study results regarding the differences in perceived psychological distress among transgender women and gay men are also consistent with other studies that found LGBT people are disproportionately impacted by psychological distress (Cochran, 2003; Dejun et al., 2016; Pearkao, 2013; Warren et al., 2016; Yadegarfar et al., 2014). However, the higher level of psychological distress of transgender women sex workers compared to gay men sex workers could be related to their specific health needs. In addition to dealing with the aforementioned issues, transgender women sex workers may experience unique stressors related to gaps in their healthcare access. During the Covid-19 pandemic, many TGW sex workers did not have access to their supplies of hormones or gender-affirming specific health care which may have had long-term impacts on their health (UNDP Thailand, 2020; Wang et al., 2020). Delays in receiving gender-affirming medical and hormonal interventions have previously been found to increase psychological distress among TGW sex workers who need these treatments (Colizzi et al., 2014). Furthermore, TGW sex workers in this study reported a higher rate of being HIV-positive than gay men sex workers. Globally, TGW and TGW sex workers are disproportionately burdened by HIV (Baral et al., 2013).

Table 10 Quality of the model and fit indices

Variables	R ² (adjusted)	Q ²	SRMR
Psychological distress	0.103 (weak)	0.065 (small)	0.077 (good)
Suicidal Ideation	0.269 (large)	0.158 (small)	

R² = coefficient of determination; Q² = cross-validated redundancy SRMR standardized root mean residual

Table 11 Results of direct hypotheses testing

Hypothesis	Path	β	SE	T values	P values	Decision
H1	Path p2 (Med to DV) PD—> SI	0.452	0.043	10.556	<0.001	Supported
H2	(IV to DV) PV—> SI	0.304	0.057	5.336	<0.001	Supported
H3	Path p1 (IV to Med) PV—> PD	0.327	0.057	5.872	<0.001	Supported

PV poverty, PD psychological distress, SI suicidal ideation

They are 66 times more likely to be HIV-positive compared to the general population above 15 years (Stutterheim et al., 2021). The high TGW sex workers' susceptibility to HIV infection indicates that they face distinctive structural (i.e., poverty due to diverse forms of stigma relevant to gender identity and no legal status), interpersonal (i.e., engaging in risky sexual behaviors), personal (i.e., high prevalence of psychological distress, suicidality, and drug use), and biological (i.e., erectile dysfunction due to feminization hormones leading to unprotected anal sex) vulnerabilities that contribute to the risk of getting HIV (Poteat et al., 2015). HIV-positive TGW show lower adherence to HIV treatment compared to cisgender men decreasing the durability of viral suppression (Mizuno et al., 2015) and mental health problems (Lacombe-Duncan et al., 2019). TGW sex workers like most sex workers or other HIV-positive individuals had limited access to antiretroviral treatment due to travel restrictions imposed by the Thai government. The travel ban prevented them from traveling to other healthcare facilities in other provinces to receive treatment. They also faced disrupted HIV-related services due to limited public transportation across the country, overcrowded healthcare centers during the Covid-19 pandemic, and reduced operating hours, or even closure of community-based HIV-related service providers for LGBT people (International Commission of Jurists, 2021). These factors put HIV-positive TGW sex workers and other LGBT individuals at a much higher risk of contracting Covid-19 (Tomar et al., 2021), which may have adversely impacted their mental well-being. Furthermore, a study by Janyam et al. (2020) has elucidated how the Covid-19 pandemic has disrupted access to condoms and pre-exposure prophylaxis for Thai sex workers, and antiretroviral therapy for HIV-positive individuals.

Consistent with previous literature, the study identified the prominent suicidal ideation associations with psychological distress (Baams et al., 2015; Cochran et al., 2003;

Dejun et al., 2016; Haas et al., 2011; Kittiteerasack et al., 2021; Price-Feeney et al., 2020) and poverty (James et al., 2016; Kittiteerasack et al., 2021). Finally, the mediation effect of poverty is supported by empirical data, where psychological distress is an important mechanism for poverty to increase the risk of suicidal ideation. The mediation role of psychological distress clarifies that financial hardships not only directly increase suicidal ideation (Zhang, 2019), but also exacerbate psychological distress (Kinitz et al., 2022; Ross et al., 2018; Steele et al., 2017), through which suicidal ideation will increase.

Based on the biopsychosocial model of health (Engel, 1977), health is dependent on the interactions between biological (i.e., elements of the human body affecting physical health), psychological (i.e., mental and emotional elements), interpersonal (i.e., social interactions), and contextual (i.e., culture, normal consideration, and policies) factors. Explaining our study results in the way that Lehman et al. (2017) explicated the interplay of those aspects, it could be argued that job loss, as a perceived financial threat caused by situational hardships, such as the Covid-19 pandemic, has exacerbated the socioeconomic burden among Thai GM&TGW sex workers and increased the likelihood of experiencing poverty. Considering the interpersonal and contextual aspects, lack of acceptance and social support resulting from the intersection between poverty, discrimination, inequality, and exclusion intensified by the illegal status of sex workers limits the GM&TGW sex workers' access to necessary financial and health care support. Psychologically, the situation decreases GM&TGW sex workers' ability to fight mental stress leading to depression and anxiety. These two psychological distress factors have been linked to an aggravated risk of suicidal ideation. Barriers to financial support and health care access, chronic exposure to Cortisol as the stress-related hormone, and continuous struggle

Table 12 The Effect Size (f^2) of exogenous variables on endogenous variables

Hypothesized paths	Effect size (f^2)	Degree of effects
Psychological distress—> Suicidal ideation	0.251	Medium
Poverty—> suicidal ideation	0.031	Small
Poverty—> psychological distress	0.116	Small

Table 13 Mediation effect results

Hypothesis	Path	Total effect (p1 • p2 + p3)	Direct effect (p3)	Indirect effect (p1 • p2)	Result	Decision
H4	Poverty—> suicidal Ideation	0.304 Sig. <0.001	0.156 Sig. 0.004	0.148 Sig. 0 <001	Complementary mediation	Supported

with depression and anxiety have made this group more vulnerable to new physical health issues that reciprocally impact and recreate psychological distress and suicidal thoughts over time.

Contributions, Implications, and Limitations

This study suggests several theoretical contributions. Firstly, this study expands the study context in the current tourism discourse. Although Covid-19 had a disastrous effect on the sex tourism industry on a global scale, this study is one of the first studies in Thailand that provided insights into GM&TGW sex workers' mental health issues and financial hardships caused by the Covid-19 pandemic. Secondly, this study incorporated poverty as a general stressor to expand the application of the MST and the STS as a theoretical basis in the sex tourism industry to explain how Thai GM&TGW sex workers' mental health may be worsened due to the unprecedented financial challenges brought by the Covid-19 pandemic. Moreover, the results of the mediation model confirm how psychological distress subsequent to the onset of Covid-19 is the underlying mechanism for poverty caused by the catastrophic collapse of the tourism industry in Thailand through which poverty influences suicidal ideation among non-heterosexual or non-cisgender sex workers. Thus, it expands the existing literature by providing evidence that the psychological distress of non-heterosexual or non-cisgender sex workers is a prominent factor that explains the contribution of poverty to suicidal ideation in the time of an unprecedented crisis.

Although the outbreak of Covid-19 severely influenced sex workers' experiences of mental and financial insecurity, it mainly acted as a magnifying glass for sex workers' existing issues worldwide (Platt et al., 2020). It also highlighted how exclusion and discrimination against sex workers is highly influenced by their gender identities and sexual orientations (Cubides Kovacsics et al., 2022; Laikram & Pathak, 2021). Put simply, Thai GM&TGW sex workers are at a higher risk of financial insecurity, mental health disparities, and limited access to social and financial support (Newman et al., 2021). Another implication of this study is that the necessity of targeted financial support and immediate mental health attention for those already reported being in a worse financial position is of prime importance.

Thai LGBT individuals are hesitant to use services from public hospitals out of fear of being discriminated against or judged by staff members (Nakhata, 2021). Thai GM&TGW sex workers may refrain from seeking mental health assistance and HIV medical support from public hospitals even if they provide free HIV-related services, unlike private Thai hospitals and clinics. Thus, mental health professionals, social service providers, and community organizations must move toward delivering free online consulting services, creating LGBT-friendly facilities in Thai public hospitals, as well as establishing cost-friendly private medical clinics for HIV treatment.

Thai law has a painful gap as it fails to enact labor laws prohibiting discrimination with regard to Thai GM&TGW sex workers where their basic rights, such as equal access to health care and financial assistance, are undermined. This study also reveals the negative effects of Thai laws and policies on the discriminatory treatment of Thai sex

Table 14 *T*-test results

Hypothesis	Variable	Group	<i>N</i>	Mean	<i>SD</i>	<i>t</i>	Sig(two-tailed)	Decision
H5	Depression	Transgender	148	2.1	0.925	2.528	0.012	Supported
		Women	122	1.82	1.094			
		Gay Men						
	Anxiety			1.7	0.911	4.183	<0.001	
				1.2	0.926			
	Stress			1.83	0.740	1.111	0.268	
			1.71	1.003				

workers. Based on the legal regulation of the sex industry, discrimination, societal exclusion, stigma, mental issues, income and employment insecurity, and violence against sex workers are nothing new among sex workers in Thailand (Chevasutho & Jiamjarasrangsri, 2022). Although Thailand's Gender Equality Act of 2015 is the only Thai law that criminalizes unfair gender discrimination, it is really difficult to protect LGBT individuals, including Thai GM&TGW, from gender-based discrimination when they lack key forms of legal recognition (e.g., gender recognition of transgender individuals, or recognition of same-sex partners; Chia & Thanaboonchai, 2020). Within this context, urgent new laws for full protection of the legal rights of Thai GM&TGW sex workers are suggested.

Local tourism authorities and health professionals aware of the increasing discrimination against this minority group during the Covid-19 pandemic need to make sufficient resources available to meet the needs of the minority as it is crucial to reducing social and economic inequalities within Thai society. It is of urgent necessity for Thailand's health-care system to discover and eliminate health disparities experienced by those individuals. Regardless of moral judgments about selling sex or insisting to consider sex work as an informal sector, the Tourism Authority of Thailand (TAT) in collaboration with the Thai Ministry of Public Health and non-profit organizations needs to establish some effective and efficient financial, social, and psychological support services (e.g., free meal vouchers and shelters, cash assistance programs, providing LGBT-friendly facilities in Thai public hospitals, cost-friendly access to antiretroviral treatment in private hospitals and clinics, free online counseling, and/or individual psychotherapy) for this minority group to help them cope with the financial hardships and psychological distress brought by the Covid-19 pandemic. These organizations need to ensure that support services are continuously available for this marginalized group whenever necessary.

The community of GM&TGW sex workers has always been a robust stakeholder in sex tourism within Thailand. During the Covid-19 pandemic, the majority of them lost their jobs and livelihood. Treating GM&TGW sex workers with dignity and eliminating their vulnerability to mental health risks intensified by the pandemic-induced poverty, violence, discrimination, and social exclusion require Thai authorities to do a series of policy-making and law reforms to legalize the sex trade. The recognition of sex workers' legal entitlements helps them have immediate access to health care and social support services as well as the justice system to seek judicial support in cases of violence, human rights abuses, and extortion (Decker et al., 2015; Platt et al., 2018). More importantly, the Thai Ministry of Public Health and TAT can play an important role in incorporating sex work into the national legal framework by providing and

sharing official data on sex workers with the Thai government, policymakers, and regulatory bodies.

The results of this study need to be interpreted with caution due to multiple limitations. First, this study is cross-sectional and the results of the cause-and-effect relationships may change over time. Second, the results may not be generalized outside Thailand or other tourist destinations within the country because the study samples are limited to Thai GM&TGW sex workers in Phuket. The third limitation refers to a non-random snowball sampling approach that limits the generalizability of the study findings, as this approach may fail to ensure the representativeness of the sample (Morgan, 2008). Hence, the results may not precisely reflect the experiences of this particular community. Furthermore, the research methodology did not reach transgender women and gay men with medically examined psychological distress symptoms; thus, the results may not fully reflect the symptom severity of depression, anxiety, and stress among the study sample. Unavailability of the previously validated Thai version of the Suicidal Ideation Scale is another limitation of this study. Finally, this study was limited to Thai GM&TGW sex workers and did not represent the experiences of migrant GM&TGW sex workers working in Phuket. These limitations suggest potential avenues of inquiry for future studies.

Conclusion

Recapitulating the results, GM&TGW sex workers have always been a significant component of Thailand's sex tourism; however, they have been largely neglected and unacknowledged because they suffer from persistent discrimination in society and work in gray areas outside the legal system in Thailand. The Covid-19 pandemic has severely disrupted the tourism industry in Thailand, which was the primary source of income for GM&TGW sex workers. Due to the lack of financial support and access to health care, they are more susceptible to psychological distress. As one of the pioneering studies focusing on GM&TGW sex workers, this research has offered an insightful understanding of the relationship between the mental health conditions of this community in Thailand and the financial hardships elicited by the Covid-19 pandemic. This study has also looked into the symptom severity of psychological distress among GM&TGW sex workers and confirmed the correlations among psychological distress, suicidal ideation, and poverty as well as the mediation effect of psychological distress. Moreover, the Covid-19 pandemic-induced poverty led to the involuntary social exclusion of GM&TGW sex workers, which imposes a substantial human cost for this vulnerable minority beyond the virus itself as it amplifies discrimination, stigma, and exclusion that may contribute directly to

suicidal ideation or through newly experienced or exacerbated psychological distress. Lastly, this study extends awareness to the under-researched yet widely discriminated LGBT community in Thailand, hoping to bring positive changes in the social and legal system in Thailand, and further contributes to the ongoing academic discussion in terms of controversial issues within the under-represented LGBT community worldwide.

Author Contribution M.Y.; validation, M.D.; formal analysis, M.Y.; investigation, M.Y.; resources, M.D. and H.Z.; data curation, M.Y.; writing—original draft preparation, M.Y., and H.Z.; writing—review and editing, M.Y., H.Z. and M.D.; visualization, M.Y.; project administration, H.Z. All authors read and approved the final manuscript.

Availability of Data and Material Not applicable.

Declarations

Ethics Approval This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by Taylor's University's Human Ethics Committee (Reference No.: HEC 2021/112).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests.

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