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The Effect of Application Piracy, Perceived Risk, and Brand Loyalty on The Decision to Subscribe to Official Spotify Services Among Students of STMB Multismart

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Abstract

This study examines how application piracy, perceived risk, and brand loyalty jointly shape the decision of university students to subscribe to the official Spotify service. The research was conducted at Sekolah Tinggi Manajemen Bisnis (STMB) Multismart, Medan, Indonesia, between July and August 2026, using a quantitative associative design. From a target population of 288 active students who had used Spotify in any form (free, modified/unauthorized, or paid Premium) during the previous six months, a sample of 74 respondents was obtained through accidental sampling, with the sample size derived from the Slovin formula at a 10% margin of error. Data were collected through a structured questionnaire measured on a five-point Likert scale and analyzed with Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS 4, following a two-stage procedure of measurement-model and structural-model assessment. The structural results show that brand loyalty has a positive and statistically significant effect on the subscription decision ($\beta = 0.468$; $t = 2.428$; $p = 0.015$), that the construct labeled perceived risk shows a positive and statistically significant effect ($\beta = 0.637$; $t = 4.297$; $p < 0.001$), and that application piracy has a negative but statistically non-significant effect ($\beta = -0.274$; $t = 1.521$; $p = 0.128$). The model explains 67.5% of the variance in the subscription decision ($R^2 = 0.675$; adjusted $R^2 = 0.661$). The findings suggest that, within this student sample, loyalty-based attachment to the Spotify brand and risk-related evaluations are the stronger correlates of choosing the official service, whereas exposure to pirated/modified applications does not meaningfully deter the subscription decision. The study offers practical implications for the design of value, trust, and loyalty strategies in subscription-based digital services, while acknowledging the limitations of a single-institution, cross-sectional, non-probability design.

Keywords:
Application piracy; Perceived risk; Brand loyalty; Subscription decision; Spotify Premium; PLS-SEM.

1. INTRODUCTION

Over the past two decades, digital technology has fundamentally reshaped how music is distributed and consumed. The industry has shifted from a model centered on physical media ownership toward one dominated by streaming and subscription-based access (Hidayat et al., 2025). Streaming platforms have become the primary infrastructure for audio distribution, displacing physical retail, paid downloads, and other traditional

modes of consumption. This transformation has altered individual consumer behavior (Agusman et al., 2025) and has redefined the business models that connect artists, record labels, distributors, and digital platforms (IFPI, 2024).

Several platforms now compete in this space, including Spotify, Apple Music, YouTube Music, JOOX, and others. Among them, Spotify holds a substantial global user base. According to the Spotify Q2 2026 investor update, the platform reports approximately 777 million monthly active users (MAUs), of whom around 300 million are Premium subscribers (Spotify, 2026). This scale indicates both the service's strong market position and the sizeable pool of free users who remain a potential conversion target for paid subscription.

Spotify, launched commercially in 2008, operates on a freemium business model. Users can access a basic ad-supported tier at no cost or pay a recurring fee for the Premium tier, which offers ad-free listening, offline downloads, unlimited skips, and more flexible playback. The intended logic of this model is that the incremental value of Premium will convert free users into paying subscribers. However, this conversion mechanism is challenged by the circulation of modified Spotify applications-commonly referred to as Spotify Mod or "unauthorized apps"-which provide Premium-equivalent features without payment (Muryani & Muanas, 2025; Imanita & Aziz, 2023). Modified applications are versions of an official application whose source code has been altered by third parties to add or unlock features (Setyaningtyas, 2025). Beyond revenue leakage, the availability of such apps may erode the perceived value of the official Premium offering (Hidayat & Valentina, 2022).

A second factor that can influence the decision to subscribe to a paid digital service is perceived risk. Perceived risk is conventionally defined as the uncertainty consumers face when they cannot foresee the consequences of a purchase decision (Zulfa & Hidayati, 2018). In the Spotify context, risk-related considerations may include recurring payment commitments, the security of payment credentials, concerns about the match between the Premium fee and perceived benefits (Trixie et al., 2024), and — importantly — risks that attach to the use of modified applications, such as account security, malware exposure, and loss of service continuity. These risk dimensions do not necessarily operate in the same direction: risks associated with the paid service may dampen willingness to subscribe, whereas risks associated with pirated applications may push users toward the official service.

Prior empirical research on perceived risk has produced mixed findings. Ansyah and Abror (2019) found that perceived risk negatively affected purchase intention in an online marketplace (Lazada) in Padang, whereas Istiqomah et al. (2019) reported a positive effect of perceived risk on purchase decisions on the Shopee platform in Lumajang. This inconsistency highlights the importance of specifying what perceived risk actually captures in a given measurement instrument before interpreting the sign of its effect.

Brand loyalty is a further construct of theoretical and managerial relevance. In increasingly competitive digital markets, loyalty is widely treated as a key mechanism for customer retention (Rokhayati et al., 2021; Linardy & Hidayat, 2022). Brand loyalty refers to the tendency of consumers to continue purchasing from a specific brand or service provider over time (Nurjanah et al., 2022) and to the strength of the attachment between a customer and a brand (Rahayu, 2019). Recent work by Florencia and Hidayat (2023) emphasizes that loyalty manifests not only in repeat purchase but also in emotional attachment, trust, positive experience, and value congruence. In the Spotify context, loyalty may be reinforced by habitual use, perceived value, switching costs associated with reconstructing playlists and personalization on another platform, and prior service experience.

Several empirical studies have reported significant effects of brand loyalty on purchase and subscription-related outcomes. Roni et al. (2025) and Toii et al. (2025) argue that the effect of brand loyalty on repurchase intention can be strengthened by customer satisfaction, although the role of satisfaction as a mediator remains contested.

Studies focusing on subscription decisions on digital platforms also offer informative, though mixed, evidence. Pramana and Rahmawati (2026) reported that brand image and service quality significantly affect the decision to subscribe to Disney+ Hotstar, whereas electronic word-of-mouth did not. Boleng et al. (2023) found that product quality and brand image significantly influenced IndiHome subscription decisions in Kupang, while price did not. Amini (2025) analyzed user experience, product variety, and social media marketing in Netflix subscription decisions. However, few empirical studies have simultaneously examined application piracy, perceived risk, and brand loyalty as determinants of subscription decisions on Spotify, particularly in the context of Indonesian university students who are heavy users of music streaming services and are frequently exposed to modified application alternatives.

This simultaneous specification constitutes the research gap and the novelty addressed by the present study. The study contributes to the literature by integrating three constructs that are usually examined in isolation-exposure to application piracy, perceived risk, and brand loyalty-into a single structural model aimed at explaining the decision to subscribe to the official Spotify service among university students at STMB Multismart. Grounded in this gap, the specific objectives of this research are: (1) to analyze the effect of application piracy on the decision to subscribe to official Spotify services; (2) to analyze the effect of perceived risk on the decision to subscribe to official Spotify services; and (3) to analyze the effect of brand loyalty on the decision to subscribe to official Spotify services.

1.1. Subscription Decision

Within the broader consumer-behavior literature, subscription decisions are often conceptualized as an extension of repeat-purchase intention. Repeat-purchase intention refers to a consumer's inclination to buy the same product or service again, whereas the related concept of subscription intention captures the plan to pay recurrently for a service over a specific period (Yusuf & Indrawati, 2019; Hasan, 2017). Yusuf and Indrawati (2019) define subscription intention as the consumer's stated plan to use or subscribe to a product or service from a specific brand. Hasan (2017) distinguishes a subscription decision-an action that has been realized-from the intention to subscribe again in the future. In the present study the dependent variable is operationalized as the subscription decision in the sense of a declared behavioral choice to subscribe to the official Spotify service, measured through self-reported indicators.

1.2. Application Piracy

Application piracy, in this study, refers to the use of modified or unauthorized versions of a legitimate application that unlock paid features without authorization from the service provider (Setyaningtyas, 2025; Muryani & Muanas, 2025). In the Spotify context, Spotify Mod enables ad-free playback, unlimited skips, offline functionality, and other Premium-equivalent features without a paid subscription (Imanita & Aziz, 2023). From a managerial perspective, the availability of such applications affects the perceived marginal value of Premium: users who can obtain functionally equivalent benefits at no cost have reduced economic incentive to subscribe. Accordingly, this study hypothesizes a negative association between application piracy and the subscription decision.

H1: Application piracy has a negative effect on the decision to subscribe to official Spotify services.

1.3. Perceived Risk

Perceived risk captures the uncertainty and potential negative consequences a consumer associates with a decision (Zulfa & Hidayati, 2018). In the setting of digital subscription services, perceived risk may encompass several distinct dimensions: financial risk tied to recurring payments, information-security and privacy risk related to payment data, service-fit risk regarding the match between the fee and perceived benefits (Trixie et al., 2024), and the specific risks associated with the use of modified applications (account suspension, malware, loss of personalization, and legal uncertainty). The sign of the relationship between perceived risk and the subscription decision therefore depends critically on which dimensions dominate the measurement instrument. When items emphasize the risks of the paid service itself, a negative effect is theoretically expected (Ansyah & Abror, 2019). When items emphasize risks associated with free or pirated alternatives, a positive effect of overall perceived risk on the decision to subscribe to the official service is theoretically plausible, consistent with results reported in some digital-commerce studies (Istiqomah et al., 2019). Because the construct in the present instrument is drawn primarily from the literature on perceived risk in digital services and includes items concerning account safety and uncertainty of outcomes, this study tests the directionally neutral hypothesis of an effect, with the empirical sign to be interpreted in light of item content:

H2: Perceived risk has a significant effect on the decision to subscribe to official Spotify services.

1.4. Brand Loyalty

Brand loyalty is conceptualized as the consumer's tendency to maintain a consistent preference for and consumption of a specific brand (Nurjanah et al., 2022), reflecting attachment that is behavioral (repeated use) and attitudinal (trust, positive experience, value congruence) (Rahayu, 2019; Florencia & Hidayat, 2023). In digital subscription services, loyal users face switching costs related to reconstructing playlists, re-training recommendation algorithms, and adapting to a new interface. These frictions, combined with habit and perceived value, are expected to increase the probability of choosing the official paid subscription. Accordingly:

H3: Brand loyalty has a positive effect on the decision to subscribe to official Spotify services.

2. RESEARCH METHOD

2.1. Research Design

This study adopts a quantitative, associative research design to analyze the simultaneous effects of application piracy (X1), perceived risk (X2), and brand loyalty (X3) on the decision to subscribe to official Spotify services (Y) among students of STMB Multismart. The quantitative approach was selected because the research questions are stated in terms of hypothesized relationships among latent constructs that are measurable through multi-item scales. Data collection took place between July and August 2026.

2.2. Population and Sample

The target population comprised all active students of STMB Multismart who had used the Spotify application in any form — free, modified/unauthorized, or paid Premium — during the six months preceding data collection. Based on records provided by the STMB Multismart academic office, the population size was

N = 288 students. The sample size was computed using the Slovin formula with a 10% margin of error (Hidayat, 2025):

$$n = N / (1 + N \cdot e^2) = 288 / (1 + 288 \times 0.01) = 288 / 3.88 = 74.23 \approx 74 \text{ respondents.}$$

Respondents were selected using accidental (convenience) sampling, a non-probability technique in which students who were encountered by the researchers and met the inclusion criteria (any form of Spotify use during the preceding six months) were invited to participate until the planned sample size was reached. It should be acknowledged that although the Slovin formula is widely used in applied business research to produce a population-anchored sample size, it does not provide a formal power analysis for latent-variable modeling, nor does it transform a non-probability sample into a probability sample. The implications of this design choice for representativeness and external validity are discussed in the Limitations section.

2.3. Data Collection and Instrument

Data were collected through a structured, self-administered questionnaire distributed directly to respondents on the STMB Multismart campus. Each item was measured on a five-point Likert scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree (Wibowo et al., 2025). The questionnaire was developed from established indicators in the prior literature on application piracy, perceived risk, brand loyalty, and subscription decisions and adapted to the Spotify context. The number of indicators per construct is: application piracy — five items (X1.1–X1.5); perceived risk — six items (X2.1–X2.6); brand loyalty — three items (X3.1–X3.3); subscription decision — four items (Y1–Y4). The exact wording of each indicator is retained in the authors' instrument file and should be presented as an appendix in the final submission (see Author Verification Checklist).

2.4. Data Analysis

Data were analyzed with Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS version 4. PLS-SEM was selected because the study aims to predict a key endogenous construct (subscription decision) from several formative/reflective exogenous constructs, the sample size is modest, and the model is exploratory in nature (Hair & Alamer, 2022; Hair et al., 2022). Analysis followed the two-step procedure of (a) assessing the measurement model (outer model) and (b) assessing the structural model (inner model).

The measurement model was evaluated through: indicator loadings (threshold ≥ 0.70, with ≥ 0.50 acceptable in exploratory settings); average variance extracted (AVE ≥ 0.50) for convergent validity; Cronbach's alpha and composite reliability (both ≥ 0.70) for internal consistency; and the Heterotrait–Monotrait ratio of correlations (HTMT < 0.90), the Fornell–Larcker criterion (√AVE of a construct greater than its correlation with any other construct), and cross-loadings for discriminant validity (Hair & Alamer, 2022; Hair et al., 2022).

The structural model was evaluated through: the inner-model variance inflation factor (VIF < 5) for collinearity; path coefficients tested through bootstrapping with 5,000 subsamples, significance assessed at $t > 1.96$ and $p < 0.05$ (two-tailed); the coefficient of determination (R^2 and adjusted R^2); and effect sizes (f^2), interpreted following Cohen's convention (0.02, 0.15, 0.35 for small, medium, and large effects). A complementary ordinary least squares (OLS) F-test on construct scores is reported as a convergent indicator of overall model significance; this test is auxiliary and is not a native PLS-SEM output.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Respondent Profile

A total of 74 questionnaires were distributed and returned fully completed, matching the planned sample size. The respondents were active students of STMB Multismart who had used Spotify in any form (free, modified, or Premium) during the preceding six months. Full demographic breakdowns were collected by the authors and should be inserted here from the original dataset before submission.

3.1.2. Measurement Model Assessment (Outer Model)

Retained from the original SmartPLS output presents the measurement model. The convergent validity results are summarized in Table 1.

Table 1. Convergent Validity (Outer Loadings and AVE)

Construct / Indicator	Outer Loading	AVE	Decision
Application Piracy (X1)		0.740	
X1.1	0.824		Valid
X1.2	0.850		Valid

X1.3	0.868		Valid
X1.4	0.863		Valid
X1.5	0.896		Valid
Perceived Risk (X2)		0.637	
X2.1	0.782		Valid
X2.2	0.811		Valid
X2.3	0.816		Valid
X2.4	0.810		Valid
X2.5	0.790		Valid
X2.6	0.780		Valid
Brand Loyalty (X3)		0.750	
X3.1	0.854		Valid
X3.2	0.877		Valid
X3.3	0.867		Valid
Subscription Decision (Y)		0.702	
Y1	0.863		Valid
Y2	0.775		Valid
Y3	0.874		Valid
Y4	0.835		Valid

Source: SmartPLS 4 output, processed by the authors.

AVE values in Table 1 have been corrected to match the SmartPLS output reproduced in Table 2 (see Statistical Audit Report accompanying this manuscript). All indicator loadings exceed 0.70, and all AVE values exceed 0.50, satisfying the threshold criteria for convergent validity (Hair et al., 2022).

Table 2. Construct Reliability and Average Variance Extracted

Construct	Cronbach's α	rho_a	Composite Reliability (rho_c)	AVE
Application Piracy (X1)	0.912	0.918	0.934	0.740
Perceived Risk (X2)	0.886	0.887	0.913	0.637
Brand Loyalty (X3)	0.833	0.835	0.900	0.750
Subscription Decision (Y)	0.858	0.865	0.904	0.702

Source: SmartPLS 4 output, processed by the authors.

All composite reliability values exceed 0.70 and all Cronbach's α values exceed 0.70, confirming internal consistency reliability (Hair et al., 2022). The mapping of statistics to constructs in the original manuscript contained a labeling inconsistency, which has been reconciled using the AVE values implied by the indicator loadings in Table 1.

3.1.2.1. Discriminant Validity: HTMT

Table 3. Heterotrait–Monotrait Ratio of Correlations (HTMT)

	Y	X3	X1	X2
Subscription Decision (Y)				
Brand Loyalty (X3)	0.889			
Application Piracy (X1)	0.772	0.854		
Perceived Risk (X2)	0.816	0.889	0.834	

Source: SmartPLS 4 output, processed by the authors.

All HTMT values are below the 0.90 threshold recommended by Hair et al. (2022). Two pairs (Y–X3 and X3–X2) are at 0.889 — close to the threshold — indicating that the pairs are conceptually related and that caution is warranted when interpreting independent effects. Under the stricter 0.85 criterion for conceptually similar constructs, these two pairs would be flagged.

3.1.2.2. Discriminant Validity: Fornell–Larcker Criterion

Table 4. Fornell–Larcker Criterion

	Y	X3	X1	X2
Subscription Decision (Y)	0.838			
Brand Loyalty (X3)	0.756	0.866		
Application Piracy (X1)	0.696	0.825	0.860	
Perceived Risk (X2)	0.803	0.851	0.845	0.798

Source: SmartPLS 4 output, processed by the authors.

Diagonal values are the square roots of the AVE; off-diagonal values are inter-construct correlations. For Y, X3, and X1, the √AVE on the diagonal exceeds the inter-construct correlations with the remaining constructs. For Perceived Risk (X2), however, the √AVE (0.798) is below its correlations with Y (0.803), X3 (0.851), and X1 (0.845), which indicates that the Fornell–Larcker condition is not fully met for X2. Although the HTMT values remain under the 0.90 threshold, this inconsistency should be transparently reported, and the authors should re-examine the X2 item set, consider dropping an item with high cross-loading, or reconsider the discriminant specification of the perceived-risk construct.

3.1.2.3. Discriminant Validity: Cross-Loadings

Table 5. Cross-Loadings

Indicator	Y	X3	X1	X2
X1.1	0.655	0.767	0.824	0.766
X1.2	0.496	0.744	0.850	0.721
X1.3	0.628	0.775	0.868	0.703
X1.4	0.539	0.744	0.863	0.637
X1.5	0.643	0.725	0.896	0.790
X2.1	0.593	0.619	0.587	0.782
X2.2	0.647	0.622	0.595	0.811
X2.3	0.650	0.610	0.560	0.816
X2.4	0.659	0.578	0.596	0.810
X2.5	0.643	0.725	0.796	0.790
X2.6	0.653	0.722	0.709	0.780
X3.1	0.627	0.854	0.773	0.669
X3.2	0.681	0.877	0.804	0.773
X3.3	0.655	0.867	0.824	0.766
Y1	0.863	0.730	0.673	0.710
Y2	0.775	0.538	0.458	0.564
Y3	0.874	0.652	0.613	0.722
Y4	0.835	0.600	0.570	0.684

Source: SmartPLS 4 output, processed by the authors.

Each indicator loads most strongly on its intended construct — with the notable exception of X2.5, whose cross-loading on Application Piracy (0.796) exceeds its loading on Perceived Risk (0.790), and X3.3, whose cross-loading on Application Piracy (0.824) is marginally lower than on Brand Loyalty (0.867) but still indicates strong overlap. These patterns are consistent with the borderline Fornell–Larcker result for Perceived Risk and the near-threshold HTMT values involving Brand Loyalty. The authors are encouraged to review item content and consider refinement.

3.1.3. Structural Model Assessment (Inner Model)

3.1.3.1. Inner-Model Collinearity (VIF)

Table 6. Inner-Model Variance Inflation Factor (VIF)

Path	VIF
Brand Loyalty (X3) → Subscription Decision (Y)	2.832
Application Piracy (X1) → Subscription Decision (Y)	2.528
Perceived Risk (X2) → Subscription Decision (Y)	1.966

Source: SmartPLS 4 output, processed by the authors.

All inner-VIF values are below 5.00, indicating that multicollinearity among the exogenous constructs does not threaten estimation. However, X3 and X1 approach the more conservative threshold of 3.0 suggested in recent PLS-SEM guidance (Hair et al., 2022), which is consistent with the borderline discriminant-validity findings for the perceived-risk and brand-loyalty constructs.

3.1.3.2. Hypothesis Testing (Path Coefficients)

Table 7. Bootstrapping Results for the Structural Paths

Path	β (O)	Mean (M)	SD	t	p
X1 → Y (Application Piracy → Subscription Decision)	−0.274	−0.252	0.180	1.521	0.128
X2 → Y (Perceived Risk → Subscription Decision)	0.637	0.635	0.148	4.297	< 0.001
X3 → Y (Brand Loyalty → Subscription Decision)	0.468	0.450	0.193	2.428	0.015

Source: SmartPLS 4 bootstrapping, 5,000 subsamples, two-tailed.

The reported p-value of 0.000 for X2 → Y is reported as $p < 0.001$ following current statistical reporting conventions. Based on the significance criteria of $t > 1.96$ and $p < 0.05$, the three structural paths are evaluated as follows: Hypothesis 1 (application piracy → subscription decision). The estimated path coefficient is negative ($\beta = -0.274$), in the direction hypothesized, but the effect is not statistically significant ($t = 1.521$; $p = 0.128$). The hypothesis is therefore not supported in a strict statistical sense; the data are consistent with a small-to-moderate negative association, but do not permit rejecting the null hypothesis of no effect at the 5% level with the present sample size ($n = 74$). Hypothesis 2 (perceived risk → subscription decision). The path coefficient is positive and statistically significant ($\beta = 0.637$; $t = 4.297$; $p < 0.001$). The hypothesis is supported in terms of the existence of an effect. The positive sign requires careful interpretation (see Section 4.5).

Hypothesis 3 (brand loyalty → subscription decision). The path coefficient is positive and statistically significant ($\beta = 0.468$; $t = 2.428$; $p = 0.015$). The hypothesis is supported.

3.1.3.3. Auxiliary Overall-Model F-Test

As a convergent check on the overall explanatory power of the model, an OLS regression of the subscription-decision composite score on the three exogenous composite scores was estimated ($k = 3$, $n = 74$, $df_1 = 3$, $df_2 = 70$). The results are reported in Table 8. This F-test is auxiliary and is not a native PLS-SEM output; it is reported to triangulate the structural results, not to replace them.

Table 8. Auxiliary OLS F-Test on Construct Scores

Source	Sum of Squares	df	Mean Square	F	p
Regression	365.189	3	121.730	48.017	< 0.001
Error	177.460	70	2.535		
Total	542.649	73			

Source: Authors' OLS regression on SmartPLS composite scores.

The '0.000' entries in the original table for cells where no statistic is defined (e.g., F for the Total row) have been corrected to blank, in line with standard reporting. The auxiliary F-statistic ($F(3, 70) = 48.017$, $p < 0.001$) is consistent with the significant collective explanatory contribution of the exogenous constructs reflected in $R^2 = 0.675$.

3.1.3.4. Coefficient of Determination (R^2)

Table 9. R-Square Values

Endogenous Construct	R^2	Adjusted R^2
Subscription Decision (Y)	0.675	0.661

Source: SmartPLS 4 output, processed by the authors.

The three exogenous constructs jointly explain 67.5% of the variance in the subscription decision (adjusted $R^2 = 0.661$). Following the thresholds suggested by Hair et al. (2022) (0.75 = substantial, 0.50 = moderate, 0.25 = weak), this is a moderate-to-strong level of explanatory power for a parsimonious model with three predictors.

3.1.3.5. Effect Sizes (f^2)

Table 10. f-Square Effect Sizes

Path	f^2	Interpretation
X2 → Y (Perceived Risk)	0.314	Medium
X3 → Y (Brand Loyalty)	0.086	Small
X1 → Y (Application Piracy)	0.031	Small

Source: SmartPLS 4 output, processed by the authors.

Following Cohen's (1988) convention (0.02, 0.15, 0.35), perceived risk makes a medium contribution to the model's predictive power, while brand loyalty and application piracy contribute small effects. The small f^2 for application piracy is consistent with its non-significant path coefficient and signals that, in this sample, exposure to pirated applications does not substantially shift the subscription decision once perceived risk and brand loyalty are accounted for.

3.1.4. Summary of Hypothesis Testing

Table 11. Summary of Hypothesis Testing

Hypothesis	Path	β; t; p	Decision
H1	Application Piracy → Subscription Decision	−0.274; 1.521; 0.128	Not Supported

H2	Perceived Risk → Subscription Decision	+0.637; 4.297; < 0.001	Supported (positive sign; see 4.5)
H3	Brand Loyalty → Subscription Decision	+0.468; 2.428; 0.015	Supported

Source: Authors

3.2. Discussion

The three structural results are discussed in turn, with explicit attention to the direction of effects, the operational content of the measurement instrument, and comparison with prior empirical work.

Application piracy and subscription decision. The estimated path from application piracy to the subscription decision is negative ($\beta = -0.274$), which is consistent with the hypothesized direction but is not statistically significant at the 5% level ($p = 0.128$). This outcome should not be interpreted as evidence that application piracy has no effect; rather, with $n = 74$ and a bootstrapping standard error of 0.180, the study is underpowered to detect an effect of this magnitude with conventional confidence. The theoretical expectation that modified Spotify applications reduce the perceived marginal value of the paid service remains plausible and is partially mirrored in the negative point estimate. However, two alternative explanations should be acknowledged. First, students who have become accustomed to modified applications may already be a self-selected group whose preferences are stable, so marginal changes in exposure may not translate directly into marginal changes in subscription decisions. Second, the measurement of application piracy in this study captures the respondent's stated use and attitudes toward Spotify Mod rather than exposure in a strict behavioral sense; attitudinal measures tend to generate noisier estimates than behavioral measures. Future research with a larger sample and behavioral indicators of modified-application use would be valuable.

Perceived risk and subscription decision. The strongest and most statistically robust effect in the model is the positive effect of perceived risk on the subscription decision ($\beta = 0.637$; $p < 0.001$; $f^2 = 0.314$). This result diverges from the classical risk-as-barrier logic (Ansyah & Abror, 2019) and is directionally closer to the finding of Istiqomah et al. (2019) that perceived risk can positively influence purchase decisions in digital-platform contexts. Three interpretive considerations deserve explicit attention. First, the sign depends on what the questionnaire items actually capture. If the perceived-risk items emphasize concerns about modified or unofficial applications (account security, malware exposure, loss of personalization, legal uncertainty), a positive sign is substantively coherent: students who are more aware of risks associated with pirated applications are more inclined to choose the official service as a risk-reduction behavior. Second, the strong overlap between perceived risk and brand loyalty revealed in the Fornell–Larcker and HTMT analyses implies that the two constructs capture partially overlapping evaluative content, which may inflate the magnitude of this coefficient. Third, cross-sectional data cannot establish causality: it is possible that students who have already decided to subscribe to the official service express higher perceived risk as a post-hoc justification. The authors should therefore avoid asserting that higher risk "causes" subscription, and should present this result as an association that is coherent with a risk-aversion interpretation but requires further confirmation with refined measurement and longitudinal data.

Brand loyalty and subscription decision. The effect of brand loyalty on the subscription decision is positive and statistically significant ($\beta = 0.468$; $p = 0.015$), consistent with the prior literature on brand loyalty in digital service contexts (Roni et al., 2025; Toii et al., 2025). Loyal users are more likely to accept recurring payment obligations because of the accumulated switching costs — reconstructed playlists, trained recommendation algorithms, habitual use — and the emotional and value-based attachment that loyalty implies (Florencia & Hidayat, 2023). The f^2 of 0.086 (small) indicates that, in this sample, loyalty contributes less uniquely to R^2 than perceived risk, but its contribution remains meaningful and statistically detectable.

Joint model performance. The three constructs jointly explain 67.5% of the variance in the subscription decision (adjusted $R^2 = 0.661$). The auxiliary OLS F-test ($F(3, 70) = 48.017$, $p < 0.001$) corroborates the significant joint contribution. Although this explanatory level is substantial, it should be interpreted alongside the measurement-model concerns raised in Section 4.2: the overlap among perceived risk, brand loyalty, and application piracy constructs — particularly in the Fornell–Larcker and cross-loading tables — suggests that part of the explanatory power may be attributable to shared evaluative content, and that construct refinement is warranted in future work.

4. CONCLUSION

This study examined how application piracy, perceived risk, and brand loyalty jointly influence the decision of STMB Multismart students to subscribe to the official Spotify service, using Partial Least Squares Structural Equation Modeling on survey data from 74 respondents. The analysis yields three main findings. First, application piracy has a negative but statistically non-significant association with the subscription decision ($\beta = -0.274$; $p = 0.128$): although the sign aligns with the theoretical expectation that pirated alternatives erode the incentive to subscribe, the evidence from this sample is not strong enough to confirm that effect. Second, the construct labeled perceived risk shows a positive and statistically significant effect on the subscription

decision ($\beta = 0.637$; $p < 0.001$); this effect is interpretable as a risk-aversion response, in which students who recognize the risks of unofficial alternatives tilt toward the official service. Third, brand loyalty has a positive and statistically significant effect on the subscription decision ($\beta = 0.468$; $p = 0.015$), consistent with switching-cost and habit-based explanations of digital service retention. The three constructs together explain 67.5% of the variance in the subscription decision, indicating a moderate-to-strong level of model fit for a parsimonious specification.

For Spotify and comparable subscription-based digital service providers, the findings suggest that strategies for converting free users into paying subscribers may be more effective when they target perceived risk and brand loyalty than when they emphasize restrictions on pirated alternatives alone. Specifically, service providers can (i) communicate the safety, continuity, and legitimacy advantages of the official service to users who are aware of the risks of modified applications; (ii) invest in loyalty-building mechanisms — personalized recommendations, playlist portability, and user-recognition features — that increase perceived switching costs; and (iii) design onboarding and retention campaigns that lower the perceived financial risk of a recurring commitment through trial periods, student pricing, and flexible payment options. The non-significant association between application piracy and the subscription decision indicates that enforcement-based strategies alone are unlikely to drive conversion within this population.

Several limitations should be acknowledged. The study is based on a small, single-institution, non-probability sample ($n = 74$ students at STMB Multismart), and the findings cannot be generalized to all university students or to all Spotify users. The design is cross-sectional, which precludes strong causal claims; the positive association between perceived risk and the subscription decision, in particular, is open to reverse-causality interpretations. The questionnaire relies on self-report, with the attendant risks of social-desirability and common-method bias. The measurement model, although meeting most convergent and reliability thresholds, exhibits borderline discriminant validity for perceived risk under the Fornell–Larcker criterion and near-threshold HTMT values for two construct pairs, which suggests that the three exogenous constructs capture partially overlapping evaluative content. The auxiliary OLS F-test is reported as a convergent indicator rather than as a native PLS-SEM output.

Future research should (i) replicate the model with larger and more diverse samples drawn from multiple institutions, ideally using probability sampling; (ii) refine the perceived-risk and brand-loyalty constructs to improve discriminant validity, for example by distinguishing financial, security, and performance risk dimensions and by separating behavioral from attitudinal loyalty; (iii) complement cross-sectional surveys with longitudinal or quasi-experimental designs capable of supporting causal inference; (iv) incorporate behavioral measures of pirated-application use alongside attitudinal measures; and (v) extend the model with mediating constructs such as perceived value, trust, and switching costs, which are theoretically positioned between the three exogenous constructs and the subscription decision.

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Ethical Statement. All participants provided informed consent prior to completing the questionnaire. No identifying information was collected. Formal ethics committee approval was not sought because, at the time of data collection, STMB Multismart did not require such review for anonymous, non-interventional, minimal-risk student survey research. Data Availability. The anonymized dataset and SmartPLS 4 project files supporting the findings of this study are available from the corresponding author on reasonable request.

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