American Journal of Medicine and Health Care (AJMHC)

VOLUME 1 ISSUE 2 (2026)



PUBLISHED BY
E-PALLI PUBLISHERS, DELAWARE, USA

American Journal of
Medicine and Health Care (AJMHC)

Volume 1 Issue 2, Year 2026
ISSN: 3143-3375 (Online)
DOI: https://doi.org/10.54536/ajmhc.v1i2.8698
https://journals.e-palli.com/home/index.php/ajmhc

Perceived Quality of Diabetes Counselling and Medication Adherence among Adults with Type 2 Diabetes in Bangladesh: The Mediating Role of Self-Efficacy

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Article Information

Received: July 16, 2026

Accepted: September 29, 2026

Published: November 03, 2026

Keywords

Bangladesh, Diabetes Counselling, Information Clarity, Interpersonal Support, Medication Adherence, Practical Tailoring, Self-Efficacy

ABSTRACT

Although medication adherence is crucial for successful treatment of type 2 diabetes, the challenge for people with diabetes is to internalize the health care provider's recommendations and regularly apply them to daily life. This study investigates the association between perceived diabetes counselling qualities and medication adherence among adults with type 2 diabetes and the mediating role of medication taking self-efficacy in that association in the context of Bangladesh. Information clarity, interpersonal support, and practical tailoring were the indicators of counselling quality. Data from a cross-sectional quantitative design with survey 640 adults at the time of prescribed diabetes medication use who reported being counselled recently by a professional. The partial least squares structural equation modelling approach was utilized to determine measurement quality, direct relationships, explained variance, effect size, and the bootstrapped indirect effects. Self-efficacy was positively related to information clarity, interpersonal support and practical tailoring. The direct link to medication adherence was highest for self-efficacy. However, interpersonal support and practical tailoring were significantly directly related to adherence, the direct path from information clarity was not significant. Significant indirect effects of all three counselling dimensions were found through self-efficacy. The results suggest that self-efficacy is a key behavioural pathway between the counselling quality and adherence and urge the importance of provision of clear, supportive, and practically oriented counselling in strengthening adherence to sustainable medication-taking practices of treated adults in Bangladesh in routine care.

INTRODUCTION

The treatment for Type 2 Diabetes is ongoing beyond the clinical encounter and therefore, the overall disease requires self-management. Prescribed medicines will only work if the patient takes them regularly and according to professional advice. Thus, adherence to therapy is an integral component of chronic care for people with diabetes. However, it can be hard to stick to the adherence guidelines. Patients should keep in mind dosing instructions, timing of doses, adherence to dosage instructions, taking the medications when they don't feel sick and embedding medications in work, family life, travel, meals and changing daily routines. By making it a behaviour as well as a clinical need or requirement, these demands make it possible to understand medication as a learning opportunity (Aloudah, 2023).

Patient can be assisted with this task by counselling, but the provision of counselling may be as significant as its quantity. Prescribing a medicine alone may not solve uncertainty and/or practical problems in a consultation. Patient explanations are required and should be understandable. They also have to have the chance to ask questions and discuss concerns and find practical solutions for coping with treatment in daily life (Islam & Akter, 2022). Therefore, counselling quality should be considered as a multi-faceted experience and not merely the transfer of information.

The present study is based on three aspects of counselling quality as perceived. Information clarity is the importance of making the information about the medicines to be given clear and specific enough. Interpersonal support refers to being listened to thoroughly, treated with respect and allowing room for questions by healthcare professionals. Practical tailoring means advice takes into account the everyday life, situation and probable treatment challenges for the patient (Shrestha *et al.*, 2020). These dimensions include cognitive, relational, and practical dimensions in counselling, which can influence patient adherence to prescribed diabetes medication.

Another factor is that not all counselling will have a direct impact on adherence. Advice may be understood but may not be felt to be possible to follow if circumstances are difficult. A useful behavioural explanation for this can be found in medication taking self-efficacy. It involves trusting and being confident in the knowledge of the ability to follow a medicine regime, to still take the medicine if feeling well, to cope with changes in the routine, and to seek the correct support when things go

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wrong. Counselling can hence play a role in adherence, helping to increase the patient's self-assurance to apply professional recommendations in the daily real life environment (Xie *et al.*, 2020).

This is particularly pertinent in Bangladesh as type 2 diabetes adults may vary in the following ways: education, place of residence, household resources, duration of diabetes, counselling source, medication type, and frequency of professional contact. Standardised instructions may not be as practical for every patient (Reisi *et al.*, 2021). So, to better understand the relationships between the various dimensions of counselling and self-efficacy and adherence, this can contribute to more patient-centered diabetes management. It can also serve as a tool for the identification and differentiation between informative and behaviourally useful communication.

This study explores perceived counselling quality, self-efficacy in taking medications and medication adherence of 640 adults with type 2 diabetes in Bangladesh. It measures direct linkages from information clarity to self-efficacy and adherence, as well as from inter-personal support and practical tailoring to self-efficacy and adherence. It also examines the direct association between self-efficacy and adherence and estimates the three indirect ways via self-efficacy. This study also distinguishes between the direct, indirect and total effects, which opens a more precise description of the prospective association of counselling quality with medication-taking behaviour.

The study makes three contributions. First, it views the quality of counselling in terms of its various dimensions rather than as a unified whole. Secondly, it makes self-efficacy the core of the pathway of behaviour between counselling and adherence. Thirdly, it assesses if the three counselling dimensions function in the same way or if they display different direct and mediated relationships. This holds the analysis beyond the mere question if counselling matters, or not. Instead, it looks at what are the most strongly linked elements of counselling to patient confidence and what is the relationship between patient confidence and adherence.

LITERATURE REVIEW

Diabetes Counselling and Medication Adherence

Additionally, outside of various healthcare providers, there are numerous decisions made again and again that are integral to medication adherence for type 2 diabetes. Medicines need to be remembered to be taken, the prescribed dose needs to be adhered to, the patient should make it a habit to keep taking medicines even if they feel well and the patient's routine should not be changed without leaving the professional instructions (Reisi *et al.*, 2021). The practical capacity, knowledge and motivation are needed to engage in these behaviours. Counselling can help with these needs as it helps to break down a clinically prescribed recommendation into ones that are understood and easy to follow (Malini *et al.*, 2020). Thus, its impact may be a function of patients' level of comprehension, patient-experience of interaction, and the ability and likelihood of implementing the guidance in real life.

The quality of counselling can be thought of in a number of complementary ways. The current research differentiates information clarity, interpersonal support and practical tailoring. This distinction is crucial since information is of little practical use if it is hard to understand. Likewise, a respectful consultation can lead to increasing engagement rates but without a viable plan (Malini *et al.*, 2020). Patient-specific recommendations are helpful but can be undermined by lack of understanding of the recommendations. A separate analysis of each dimension enables the detection of each dimension's relationship with self-efficacy and adherence (Jennings *et al.*, 2021).

Information Clarity

Information clarity, which is the extent to which information explanations about medication are understandable, specific, and usable. Patients should be informed of the dose, time, and instructions for taking medications, what to do if they miss a dose, and what to do if the medications may be causing her/him problems (Al-Salmi *et al.*, 2022). Even if the clinical recommendation is right, explanations might be ambiguous, leading to uncertainty. The uncertainty can be reduced by communication to inform patients about expected behaviour (Köbling *et al.*, 2022).

Clarity can also increase their confidence in taking their medication. With patients still not knowing what the right thing is to do, confidence is hard to maintain. Clear instructions improve the likelihood that patients will manage their medication taking routine and be able to handle common problems (Wibowo *et al.*, 2022). This may mean that information clarity can be directly related to adherence, but also indirectly related via increased self-efficacy.

H1: Perceived information clarity in diabetes counselling is positively associated with medication-taking self-efficacy.

H4: Perceived information clarity in diabetes counselling is positively associated with medication adherence.

Interpersonal Support

Interpersonal support reflects the nature of the relationships in counselling. It is a reflection of how well the health care professional listens, how well he or she lets the person ask questions, and how he or she responds in a respectful manner, as well as how much sense of openness is established to discuss medication challenges (Mannan *et al.*, 2021). When a consultation is rushed or perceived as being judgmental, the patient may not report if they forget to take a dose, if they are confused about how to take it, or if they have concerns about the treatment. This barrier can be decreased through a supportive interaction, which can lead to greater participation (Shiyanbola *et al.*, 2022).

This relationship quality may foster self-efficacy as patients who are able to express struggles will be more likely to get clarification and practical reassurance. Supportive

counselling may also enhance the process of engagement and ensure that patients feel their concerns are being addressed (Pramesti *et al.*, 2021). Interpersonal support is consequently assumed to be related to both confidence and compliance.

H2: Perceived interpersonal support in diabetes counselling is positively associated with medication-taking self-efficacy.

H5: Perceived interpersonal support in diabetes counselling is positively associated with medication adherence.

Practical Tailoring

The practical tailoring refers to how the counselling is adjusted to the patient's lifestyle, situation and treatment. Prescribed medication is taken in the context of daily routines that can involve employment, family life, travel, eating and drinking, and conflicting demands (Kim *et al.*, 2021). Advice, which may be generic in nature, may therefore be difficult to implement even if understood. Tailored counselling makes an effort to link medical instructions to these practical issues (Alharbi *et al.*, 2023). Self-efficacy should be increased by tailoring, as a realistic plan can provide a greater understanding of how the drug may be managed in real-world situations. It can also affect adherence directly, by decreasing the discrepancy between suggested behaviour and actual day to day practice. Advice that speaks to anticipated obstacles has more potential to be acted on than abstract advice (Y.-M. Huang & Shiyanbola, 2021).

H3: Practical tailoring of diabetes counselling, as perceived by the participants, is positively related to self-efficacy in taking the medication.

H6: Perceived practical tailoring of diabetes counselling is positively related to medication adherence.

Medication-Taking Self-Efficacy

Medication-taking self-efficacy is confidence in the ability to adhere to the treatment regimen when situation changes. It contains self-confidence in taking medication at the correct time, keeping on schedule when changes in routine occur, continuing medications even though symptoms have gone away, seeking advice when medication issues occur, and handling medications while engaged in other activities. This is key as knowing how to do an instruction does not mean that the patient feels they are able to do it regularly (J. Huang *et al.*, 2021).

Those patients who have a high self-efficacy should be more capable to continue the medication behaviour in response to normal disruptive events (Rahman *et al.*, 2020). Thus, self-efficacy can be a means by which knowledge and counselling support can be transformed into action. In the proposed model, it is hypothesized to directly positively relate to medication adherence.

H7: There is a positive correlation between medication taking self-efficacy and medication adherence.

Mediating Role of Self-Efficacy and Conceptual Framework

This study seeks to suggest that part of the reason why counselling quality is linked to adherence is because of the influence it has on the confidence of the patient in managing medication. When it comes to the information, clear information can help to reduce uncertainty (Putri & Suzalin, 2023). Support from others can help to identify and discuss concerns. Realistic strategies for integration of treatment in daily life can be gathered from practical tailoring. These processes can lead to greater self-efficacy that in turn can lead to greater consistency of medication taking (Abebe *et al.*, 2022).

Three exogenous constructs thus feature in the conceptual framework: information clarity, interpersonal support and practical tailoring. The mediator is the medication-taking self-efficacy and the final endogenous construct is medication adherence (Madran & Jassim, 2022). Direct pathways are also identified between all the counselling dimensions and self-efficacy as well as between self-efficacy and adherence. Three indirect effects separately are also measured, namely, IC → SE → MA, IS → SE → MA, and PT → SE → MA (Wu *et al.*, 2023).

H8: Medication-taking self-efficacy mediates the associations between the three perceived counselling-quality dimensions and medication adherence.

Evaluation of the mediation paths is separate. It is needed since support for one indirect pathway does not mean support for others. As a result, it enables mechanisms underlying the association between counselling quality and medication adherence to be identified both overall and within the dimensions.

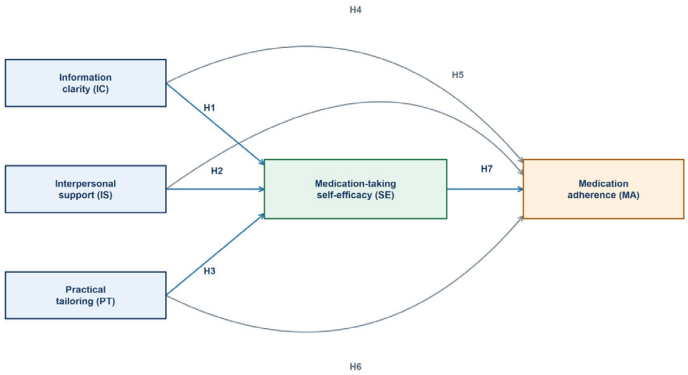


Figure 1: Conceptual framework of diabetes counselling quality, self-efficacy, and medication adherence.

MATERIALS AND METHODS

Research Design and Study Population

It was a quantitative cross-sectional design aimed at finding associations among perceived quality of diabetes counselling, medication taking self-efficacy and medication adherence. The design was suitable as it involved several latent constructs and simultaneous assessment of direct and mediated relationships were required in the proposed model (Chen, 2023). The study had an explanatory approach. It did not aim at describing only counsellor experiences, but on assessing a delineated behavioral structure of counselling quality – adherence.

Data were analyzed from 640 adult type 2 diabetes patients in Bangladesh. Respondents were included in the study if they were at least 18 years old, had a diabetes diagnosis by a health care provider, were prescribed diabetes medication, and had received counselling or advice from a health care provider on diabetes management in the last three months. Counselling may have occurred via a doctor, a nurse, a pharmacist, a diabetes educator or a combination of professionals.

Survey Instrument and Construct Measurement

The questionnaire was structured with respondent characteristics and five reflective constructs that were used to collect data. Three dimensions of perceived counselling quality were used. Information clarity comprised four items: understandable explanations of the use of medicines, time of use, missed doses and any problems related to the medicines. Interpersonal support was composed of four items that related to attentive listening, asking questions, respectful answers and being helped to talk about difficulties. Practical tailoring consisted of 4 items measuring consideration of daily life habits, practical obstacles, personal factors, treatment needs, and creation of a medication plan (Earley, 2023).

Five items were used to assess medication-taking self-efficacy. These items measure confidence in taking medicine as prescribed, continuing to take medicine when schedules changed, taking medicine when feeling well, asking the right questions when having problems and taking medicines when busy. Adherence to the medication was assessed through 4 questions pertaining to behaviour over the past 4 weeks: taking the medication as prescribed, following the timing of the medications, following the dose and continuing medications when feeling well (Moura & Neves, 2025).

A five-point Likert response scale was used for all items in the constructs (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree, and 5 = agree very strongly). Counselling perceptions were greater with higher scores; medication taking self-efficacy was stronger with higher scores as was self-reported medication adherence. None of the items had to be reverse scored.

Data Analysis

Partial least squares structural equation modelling was used to assess the conceptual model. The analysis was conducted in a two-stage process. First, measurement models were checked. Outer loadings were used to assess the reliability of indicators. Internal consistency reliability was examined by using Cronbach's alpha, rho_A and composite reliability. Average variance extracted was used to measure convergent validity. Heterotrait-monotrait ratio was used as a measure of discriminative validity (Zhang & Chen, 2022).

Diagnostic checks of VIFs for full-collinearity were conducted to assess possible common method-related collinearity. We then looked at the inner VIF values to determine collinearity among the predictors in the structural model. These checks were made prior to interpreting the estimated structural paths.

Second, it was tested to see if the structural model is useful. H1-H7 were estimated using standardised path coefficients. Bootstrap standard errors, t values, p values and 95% confidence intervals were used to assess statistical significance. Self-efficacy and medication adherence R2 and adjusted R2 were used to determine the explained variance. F^2 effect sizes for the individual predictors were examined.

Three specific indirect effects of mediation were examined: IC → SE → MA, IS → SE → MA, and PT → SE → MA. Bootstrapped confidence intervals were used for the evaluation of each indirect effect separately. An indirect relationship was considered to be supported if the 95% confidence interval did not contain zero. All three (direct, indirect and total effects) were combined for a coherent interpretation of the behavioural role of self-efficacy.

Model Specification

The underlying perceptions or behaviours were measured by the observed variables and thus all five latent variables were modelled as reflective. Three distinct exogenous constructs were created: information clarity, interpersonal support, and practical tailoring, and were not synthesized into a higher order score. This specification maintained the distinction in concept between each of the three counselling dimensions and permitted comparison between the relative structural contributions of each dimension. An endogenous mediator, namely self-efficacy, was identified and was hypothesized to be predicted by the three dimensions of counselling. The last endogenous construct predicted by the counselling dimensions and self-efficacy was medication adherence. This relationship clearly matched the eight hypotheses, and the direct and mediated relationships were separately estimated (Moura & Neves, 2025).

Ethical Considerations

The participants were included through voluntary participation and informed consent. Participants were made aware of the purpose of the research and that they had the option of omitting a question or ending their participation. Responses were to be used for research purposes only and were not to be used to identify

individual participants. The study also recognises an important design limitation. Given the cross-sectional nature of the data, the inferred structural paths should be viewed as associated paths between the measured constructs and are not indicative of any temporal causal paths.

RESULTS AND DISCUSSION

Respondent Characteristics

As seen in table 1, the population sample was heterogeneous in terms of age, sex, education, place of residence, duration of the disease, pattern of treatment, source of counselling, frequency of consultation,

Table 1: Respondent Characteristics

Variable	Category	Frequency	Percentage (%)
Age Group	18–29	99	15.469
Age Group	30–39	95	14.844
Age Group	40–49	178	27.812
Age Group	50–59	183	28.594
Age Group	60 or older	85	13.281
Gender	Man	243	37.969
Gender	Prefer not to say	134	20.938
Gender	Woman	263	41.094
Education	Higher secondary	99	15.469
Education	No formal education	120	18.750
Education	Postgraduate or above	105	16.406
Education	Primary	109	17.031
Education	Secondary	80	12.500
Education	Undergraduate	127	19.844
Residence	Peri-urban	148	23.125
Residence	Rural	252	39.375
Residence	Urban	240	37.500
Diabetes Duration	1–4 years	213	33.281
Diabetes Duration	10 years or longer	104	16.250
Diabetes Duration	5–9 years	217	33.906
Diabetes Duration	Less than 1 year	106	16.562
Diabetes Medicine	Both tablets and insulin	135	21.094
Diabetes Medicine	Insulin only	133	20.781
Diabetes Medicine	Tablets only	372	58.125
Doses Per Day	Four or more times	110	17.188
Doses Per Day	Once	117	18.281
Doses Per Day	Three times	99	15.469
Doses Per Day	Twice	189	29.531
Doses Per Day	Varies	125	19.531
Counselling Source	Diabetes educator	91	14.219
Counselling Source	Doctor	272	42.500
Counselling Source	More than one	97	15.156
Counselling Source	Nurse	89	13.906
Counselling Source	Pharmacist	91	14.219
Consultations (3 Months)	One	241	37.656
Consultations (3 Months)	Three or more	144	22.500
Consultations (3 Months)	Two	255	39.844
Household Income (BDT)	20,000–39,999	127	19.844
Household Income (BDT)	40,000–59,999	149	23.281
Household Income (BDT)	60,000 or above	121	18.906
Household Income (BDT)	Below 20,000	115	17.969
Household Income (BDT)	Prefer not to say	128	20.000

and the amount of income they receive. Respondents aged 50-59 formed the largest age group (28.594%), followed closely by those aged 40-49 (27.812%). Women represented 41.094% and men 37.969% of the sample. The percentage of rural residents was 39.375%. The most common medication regime was tablet only (58.125%) and the main source of counselling was doctor (42.500%). The sample is diverse; they provide a wide context for exploring perceived quality of counselling and medication taking behaviour.

Descriptive Statistics of Measurement Items

Average response was at the moderate level, for all five constructs, in the descriptive results at the item level.

Table 2: Descriptive Statistics of Measurement Items

Construct	Item	N	Mean	SD	Minimum	Maximum
IC	IC1	640	3.205	1.196	1	5
IC	IC2	640	3.067	1.247	1	5
IC	IC3	640	2.945	1.203	1	5
IC	IC4	640	3.133	1.194	1	5
IS	IS1	640	3.108	1.210	1	5
IS	IS2	640	2.961	1.235	1	5
IS	IS3	640	3.083	1.221	1	5
IS	IS4	640	2.955	1.201	1	5
PT	PT1	640	3.033	1.251	1	5
PT	PT2	640	2.964	1.170	1	5
PT	PT3	640	3.112	1.217	1	5
PT	PT4	640	3.031	1.211	1	5
SE	SE1	640	3.164	1.209	1	5
SE	SE2	640	2.987	1.213	1	5
SE	SE3	640	3.116	1.247	1	5
SE	SE4	640	2.981	1.222	1	5
SE	SE5	640	3.125	1.231	1	5
MA	MA1	640	3.103	1.228	1	5
MA	MA2	640	2.970	1.207	1	5
MA	MA3	640	3.145	1.223	1	5
MA	MA4	640	2.956	1.224	1	5

Means ranged from 2.945 for IC3 to 3.205 for IC1. Self-efficacy item means were between 2.981 and 3.164 and medication adherence means between 2.956 and 3.145. Standards deviations were mostly 1.17–1.25 showing considerable variation in individual responses. Each object was used throughout the whole range of the scale observed (1-5). Such distributions are adequate to explore the relationships between the latent constructs in the following PLS-SEM analysis.

Assessment of Common Method Bias

Full-collinearity VIF values ranged from 1.064 for interpersonal support to 1.524 for self-efficacy. These values were all low and well below commonly used thresholds for problematic collinearity. The results thus do not show high levels of collinearity between the study constructs due to common method related issues. This diagnostic result suggests that the measurement and structural models should be further investigated without findings that the estimated relationships are inflated due to over-salience of a common source of the measurement (Xie *et al.*, 2020).

Table 3: Common Method Bias: Full-Collinearity VIF

Construct	Full-Collinearity VIF
IC	1.116
IS	1.064
PT	1.191
SE	1.524
MA	1.446

Indicator Reliability

All reflective indicators showed satisfactory outer loadings. The loadings ranged from 0.712 for PT1 to 0.860 for IC4. Each item therefore exceeded the commonly applied 0.70 benchmark and made an adequate

Table 5: Reflective Indicator Outer Loadings

Construct	Item	Outer Loading
IC	IC1	0.760
IC	IC2	0.739
IC	IC3	0.828
IC	IC4	0.860
IS	IS1	0.763
IS	IS2	0.809
IS	IS3	0.783
IS	IS4	0.842
PT	PT1	0.712
PT	PT2	0.806
PT	PT3	0.801
PT	PT4	0.835
SE	SE1	0.788
SE	SE2	0.818
SE	SE3	0.753
SE	SE4	0.823
SE	SE5	0.765
MA	MA1	0.788
MA	MA2	0.827
MA	MA3	0.789
MA	MA4	0.775

contribution to its intended construct. The pattern was also consistent across information clarity, interpersonal support, practical tailoring, self-efficacy, and medication adherence. No indicator required removal on the basis of weak loading, allowing the complete set of proposed measurement items to be retained for reliability, validity, and structural assessment.

Reliability and Convergent Validity

The reliability and convergent validity were, in general, good. Cronbach's alpha ranged from 0.869 to 0.893, rho_A ranged from 0.871 to 0.893, and composite reliability ranged from 0.869 to 0.892. The reliability of the five constructs is acceptable with these values. All constructs had average variance extracted between 0.624 and 0.640, with more than half of the variance in each indicator explained by the constructs. Thus, the measurement model exhibited appropriate internal consistency and convergent validity, prior to the interpretation of the structural relationships (Zang, 2023).

Table 6: Discriminant Validity: HTMT

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE
IC	0.875	0.878	0.875	0.637
IS	0.877	0.878	0.876	0.640
PT	0.869	0.871	0.869	0.624
SE	0.893	0.893	0.892	0.624
MA	0.873	0.873	0.873	0.632

Discriminant Validity

HTMT values ranged from 0.087 to 0.581. This value was highest between self-efficacy and medication adherence and was still below the conventional cut-off value to indicate issues with discriminant validity. The remaining construct pairs had even lower ratios. The findings show that information clarity, interpersonal support and practical tailoring, self-efficacy and medication adherence are all empirically distinct. They can thus be viewed as distinct latent variables rather than, as in CFA, as different ways of measuring the same concept.

Structural Model Collinearity

The values of structural VIF varied from 1.011 to 1.288. VIF values were 1.026 for information clarity, 1.011 for interpersonal support and 1.025 for practical tailoring for self-efficacy. The corresponding values for Information Clarity, Interpersonal Support, Practical Tailoring and Self-efficacy for medication adherence were 1.106, 1.050, 1.146 and 1.288 respectively. These low values suggest that there is little multicollinearity among the structural

Table 7: Structural Model Collinearity: Inner VIF

Outcome	Predictor	Inner VIF
SE	IC	1.026
SE	IS	1.011
SE	PT	1.025
MA	IC	1.106
MA	IS	1.050
MA	PT	1.146
MA	SE	1.288

predictors (Alharbi *et al.*, 2023). Thus, it may be assumed that the estimated path coefficients may be interpreted in the absence of evidence that the excessive overlap among predictors materially affected results.

Direct Effects and Hypothesis Testing

Results of the direct hypotheses yielded support for six of seven. Information clarity, interpersonal support and practical tailoring were all positively related to self-efficacy, of which practical tailoring had the highest coefficient (β = 0.341). There were also strong direct positive relationships between interpersonal support and medication adherence and between practical tailoring and medication adherence. There was a positive but not significant direct path from information clarity to adherence (β = 0.075, p = 0.063) and thus, H4 was not supported. As predicted in H7 and as shown in the model, self-efficacy was directly most related to adherence to medicines (β = 0.456, p < 0.001).

Table 8: Direct Effects and Hypothesis Tests (H1-H7)

Hypothesis	Path	Beta	Bootstrap SE	t-value	p-value	2.5% CI	97.5% CI	Decision
H1	IC → SE	0.275	0.037	7.335	<0.001	0.200	0.347	Supported
H2	IS → SE	0.191	0.039	4.907	<0.001	0.117	0.270	Supported
H3	PT → SE	0.341	0.039	8.777	<0.001	0.267	0.419	Supported
H4	IC → MA	0.075	0.040	1.858	0.063	-0.003	0.153	Not supported
H5	IS → MA	0.103	0.039	2.648	0.008	0.026	0.176	Supported
H6	PT → MA	0.186	0.043	4.287	<0.001	0.101	0.270	Supported
H7	SE → MA	0.456	0.042	10.882	<0.001	0.374	0.538	Supported

Explained Variance

The total variance accounted for by the three counselling-quality dimensions was 22.4% (R2 = 0.220). The whole model accounted for 30.8% of the variance in medication adherence with an adjusted value of 0.304. The small difference between the unadjusted and adjusted values suggests the number of predictors did not produce noticeably inflated explanatory estimates. Results indicate that models have meaningful explanatory power and that there are other patient, treatment, healthcare and contextual factors that are not captured in the current model that affect adherence (Abebe *et al.*, 2022).

Table 9: Explained Variance of Endogenous Constructs

Endogenous Construct	Number of Predictors	R^2	Adjusted R^2
SE	3	0.224	0.220
MA	4	0.308	0.304

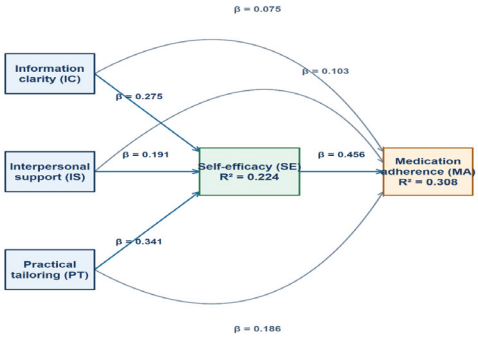


Figure 2: PLS-SEM structural model showing standardised path coefficients and explained variance (R^2).

Structural Effect Sizes

Estimates of effect-size help to clarify the contribution of each of the predictors. The largest f^2 value was for self-efficacy (0.118), followed by information clarity (0.079) and interpersonal support (0.039) with practical tailoring. When it comes to medication adherence, self-efficacy had the biggest effect size (0.183), with practical tailoring having a smaller effect size (0.040). Information clarity (0.009) and interpersonal support (0.014) had small direct effects on adherence. The pattern is in line with the structural coefficients and indicates that self-efficacy has significant impact on the explanatory power of the adherence model.

Table 10: Structural Path Effect Sizes

Predictor	Outcome	Full-model R^2	Reduced-model R^2	f^2
IC	SE	0.224	0.162	0.079
IS	SE	0.224	0.194	0.039
PT	SE	0.224	0.132	0.118
IC	MA	0.308	0.302	0.009
IS	MA	0.308	0.299	0.014
PT	MA	0.308	0.281	0.040
SE	MA	0.308	0.182	0.183

Mediation Analysis

All three specific indirect effects via self-efficacy were significant. The indirect effects ranged from 0.125 to 0.155, with information clarity having the smallest indirect effect, interpersonal support having the second smallest indirect effect, and practical tailoring having the largest indirect effect. All three components of H8 were supported by each of the bootstrapped 95% confidence intervals, which did not contain zero. The result is significant for information clarity, as the direct impact on adherence was not. For the indirect effect, the value was significant because it implies that clarity is related to adherence primarily through the self-efficacy for medication taking in the model.

Table 11: Specific Indirect Effects Through Self-Efficacy

Hypothesis Component	Indirect Path	Indirect β	Bootstrap SE	t-value	p-value	2.5% CI	97.5% CI	Decision
H8: IC	IC → SE → MA	0.125	0.021	5.916	<0.001	0.086	0.169	Supported
H8: IS	IS → SE → MA	0.087	0.019	4.467	<0.001	0.051	0.128	Supported
H8: PT	PT → SE → MA	0.155	0.024	6.530	<0.001	0.114	0.207	Supported

Direct, Indirect and Total Effects

Practical tailoring had the highest overall association with medication adherence (0.341) in the decomposition of effects. The total effect of information clarity was 0.200 and for interpersonal support it was 0.190. The indirect effect via self-efficacy (0.125) was greater than the direct effect (0.075), for the purposes of information clarity. For practical tailoring, both direct and indirect components were substantial. These findings indicate that we should not only depend upon a direct path for interpretation. Mediated effects provide further insight into the underlying behaviours that would otherwise be masked (Wu *et al.*, 2023).

Table 12: Direct, Indirect and Total Effects on Adherence

Predictor	Outcome	Direct Effect	Indirect Effect via SE	Total Effect
IC	MA	0.075	0.125	0.200
IS	MA	0.103	0.087	0.190
PT	MA	0.186	0.155	0.341

Summary of Hypothesis Testing

A hypothesis summary is used to establish a consistent trend among the suggested model. Counselling-quality

Table 13: Summary of Hypothesis Testing

Hypothesis	Relationship	Effect Type	Estimated Effect	2.5% CI	97.5% CI	Decision
H1	IC → SE	Direct	0.275	0.200	0.347	Supported
H2	IS → SE	Direct	0.191	0.117	0.270	Supported
H3	PT → SE	Direct	0.341	0.267	0.419	Supported

H4	IC → MA	Direct	0.075	-0.003	0.153	Not supported
H5	IS → MA	Direct	0.103	0.026	0.176	Supported
H6	PT → MA	Direct	0.186	0.101	0.270	Supported
H7	SE → MA	Direct	0.456	0.374	0.538	Supported
H8: IC	IC → SE → MA	Indirect via SE	0.125	0.086	0.169	Supported
H8: IS	IS → SE → MA	Indirect via SE	0.087	0.051	0.128	Supported
H8: PT	PT → SE → MA	Indirect via SE	0.155	0.114	0.207	Supported

dimensions of H1, H2, and H3 were found to have a positive relationship with self-efficacy. H5 and H6 received support for the direct relationships between interpersonal support and practical tailoring and adherence, respectively, and H4 was not supported. H7 was supported and was the highest direct structural coefficient. Finally, all three indirect elements of H8 were corroborated. In sum, the results uniformly suggest that self-efficacy is a key mediator between perceived counselling quality and adherence to medications (Rahman *et al.*, 2020).

Discussion

The results indicate that the quality of counselling is related to adherence to medication generally through patients' confidence in the management of their medication. Adherence had a significant direct link to all three counselling dimensions, the strongest of which was self-efficacy, which was in turn significantly related to all three counselling dimensions. This indicates that counselling is most behaviourally meaningful in that it assists the patient to feel capable to execute the medication instructions in situations of normalcy and challenge.

Information clarity was a strong direct predictor of self-efficacy and was not directly related to adherence of a clinically significant level. This difference is important. While simple explanation of the situation might help to decrease the uncertainty about dosage time, forgot to take or any medicine-related issues; knowledge alone does not necessarily ensure adherence to the dosage (Zang, 2023). The indirect pathway of information clarity to adherence, mediated by self-efficacy, is an important one, because information clarity can be useful when it helps to increase self-efficacy in action. This results in a difference between knowing how to and believing that the behaviour can be sustained.

There was a positive correlation between interpersonal support and self-efficacy as well as between interpersonal support and adherence. Opportunities for patients to seek clarification, careful listening, and respectful responses can help engage patients in treatment and encourage them to attend to the treatment. The meaningful indirect effect further suggests that supportive communication can have a significant impact on promoting confidence, which has a direct impact on adherence. The interpersonal support hence seems to be relationally as well as behaviourally important (Al-Salmi *et al.*, 2022).

The counselling dimensions with the highest association with self-efficacy were practical tailoring and the highest total effect was for practical tailoring and adherence. This finding highlights the importance of advice tailored to real-life situations. Medications have to be managed around work, eating, family life, and mobility, as well as adjusting to various schedules. Counselling which can foresee these can change general instructions into performable guidance. Obvious direct and indirect consequences indicate that tailoring could help adherence through making recommendations more actionable and for example increasing confidence towards the management (Wu *et al.*, 2023).

The most direct influential factor of adherence in the model was self-efficacy. It had a higher coefficient and effect size than the counselling dimensions. This discovery further strengthens the concept that information exposure alone doesn't affect medication-taking. Patients also have to be convinced that they can keep on taking a treatment during treatment changes, during feeling well or when competing demands are present.

The model accounted for 30.8% of the variance in adherence. This is not only a good explanatory value for a focused counselling framework but it also indicates that adherence is still multidetermined. Medication behaviour may be influenced by other things than counselling and self-efficacy. Despite this, the substantial direct and indirect routes suggest a strong link between the quality of professional communication and patients' self-perceptions of treatment management ability and their medication adherence.

Given that, the total-effect results support this interpretation. Information clarity was marginally directly related to adherence but this relationship became significant when the mediated relationship via self-efficacy was added. The highest total relationship was seen in practical tailoring which had a direct coefficient of 0.41 and an indirect coefficient of 0.51. The patterns indicate that only direct effects would give an incomplete picture of the value of counselling. A mediation perspective brings to light how counselling can initially affect a behavioural resource within the individual and can then be linked to adherence. This is particularly pertinent with communication interventions, where the direct effect may be a higher level of confidence, and not actual medication behavior (Köbling *et al.*, 2022).

Theoretical and Practical Implications

The study has theoretical and practical implications. Theoretically it shows that the quality of counselling should not be considered as one universal phenomenon. Structural patterns with respect to information clarity, interpersonal support and practical tailoring were evident. The mediation results also suggest that self-efficacy is a mediating pathway of behaviour between counselling experiences and adherence, particularly when there is no direct self-efficacy effect of a counselling dimension (Madran & Jassim, 2022).

In a practical sense, diabetes counselling should go beyond providing the correct instructions. Healthcare providers should ensure that patients understand the directions for their medicines, allow time for questions and discuss hindering behaviours in an open way. Consider also how counselling is tailored to the patient's routine and treatment situation. The practical tailoring indicates that a practical medication plan can be more beneficial than general advice (Aloudah, 2023). Providers can also determine whether or not patients feel sure about their appointments, changes to their routine, if they should continue medication if they're feeling better, etc., and whether they find it easy to go out and get help if something goes wrong. This confidence could be enhanced and make counselling more of a behavioural value.

Counselling at service level could involve not only providing common medication instructions, but also giving hints about routine, missed doses and probable challenges. Diabetes-care professional training might be focused on teaching back techniques, respectful questioning and hands-on problem solving. This doesn't mean counselling has to be long - it just means it has to be more responsive to the patient's capacity to apply the advice.

Limitations and Future Research

There are also some drawbacks to note. Causality in the time frame is not demonstrated by the cross-sectional design and the estimated paths should be considered as associations. Adherence to medications was self-reported and may not reflect behaviour through other means. A large part of the variance of adherence to the model was also not explained. Longitudinal designs, other measures of adherence or other predictors like treatment complexity, access to treatment, family support, or continuity of care may be useful in future studies. Additional analyses might also look for age, place of residence, duration of diabetes, medication types, and counselling sources to see if there are differences in structural relationships.

Given the nature of the study, which highlighted recent counselling experiences, future research can be conducted to determine whether the relationships observed here persist to a greater extent of treatment and within other healthcare settings in Bangladesh.

CONCLUSION

This study demonstrates that perceived diabetes counselling quality has direct and indirect associations with adherence to diabetes medications. Increase in medication taking self-efficacy due to information clarity, interpersonal support and practical tailoring. Self-efficacy proved to be the most direct predictor of adherence, while also significantly mediated all three counselling-quality relationships. The most total association with adherence was through self-efficacy and practical tailoring. The results show that effective counselling ought to be easy to understand, supportive and an aspect of everyday life. Healthcare treatment guidelines and advice that patients can confidently use to manage their medication can be more behaviourally significant to have an impact on diabetes care.

REFERENCE

Abebe, A., Wobie, Y., Kebede, B., Wale, A., Destaw, A., & Ambaye, A. S. (2022). Self-care practice and glycemic Control among type 2 diabetes patients on follow up in a developing country: A prospective observational study. *Journal of Diabetes & Metabolic Disorders, 21*(1), 455–461. https://doi.org/10.1007/s40200-022-00995-4

Alharbi, S., Alhofaian, A., & Alaamri, M. M. (2023). Illness Perception and Medication Adherence among Adult Patients with Type 2 Diabetes Mellitus: A Scoping Review. *Clinics and Practice, 13*(1), 71–83. https://doi.org/10.3390/clinpract13010007

Aloudah, N. M. (2023). A Qualitative Study on the Perception of Medication Adherence by the Social Circles of Patients with Type 2 Diabetes. *Patient Preference and Adherence, Volume 17*, 973–982. https://doi.org/10.2147/PPA.S404092

Al-Salmi, N., Cook, P., & D'Souza, M. S. (2022). Diet Adherence among Adults with Type 2 Diabetes Mellitus: A Concept Analysis. *Oman Medical Journal, 37*(2), e361–e361. https://doi.org/10.5001/omj.2021.69

Chen, Y. (2023). Methodology. In Y. Chen, *Surface Plasmon Resonance Imaging* (Vol. 95, pp. 91–164). Springer Nature Singapore. https://doi.org/10.1007/978-981-99-3118-7_4

Earley, E. J. (2023). *Methodology*. https://doi.org/10.17605/OSF.IO/FN4J2

Huang, J., Ding, S., Xiong, S., & Liu, Z. (2021). Medication Adherence and Associated Factors in Patients With Type 2 Diabetes: A Structural Equation Model. *Frontiers in Public Health, 9*, 730845. https://doi.org/10.3389/fpubh.2021.730845

Huang, Y.-M., & Shiyanbola, O. O. (2021). Investigation of Barriers and Facilitators to Medication Adherence in Patients With Type 2 Diabetes Across Different Health Literacy Levels: An Explanatory Sequential Mixed Methods Study. *Frontiers in Pharmacology, 12*, 745749. https://doi.org/10.3389/fphar.2021.745749

Islam, Md. S., & Akter, M. (2022). A Survey About The Current Scenario of Diabetes in Chattogram Area by Determining Practice of the Self-Care Activities Amongst People with Diabetes. *Universal Journal of*

Pharmaceutical Research. https://doi.org/10.22270/ujpr.v7i1.722

Jennings, H. M., Morrison, J., Akter, K., Haghparast-Bidgoli, H., King, C., Ahmed, N., Kuddus, A., Shaha, S. K., Nahar, T., Azad, K., & Fottrell, E. (2021). Care-seeking and managing diabetes in rural Bangladesh: A mixed methods study. *BMC Public Health, 21*(1), 1445. https://doi.org/10.1186/s12889-021-11395-3

Kim, H., Sereika, S. M., Lingler, J. H., Albert, S. M., & Bender, C. M. (2021). Illness Perceptions, Self-efficacy, and Self-reported Medication Adherence in Persons Aged 50 and Older With Type 2 Diabetes. *Journal of Cardiovascular Nursing, 36*(4), 312–328. https://doi.org/10.1097/JCN.0000000000000675

Köbling, T., Katona, É., Maroda, L., Váradi, Z., Somodi, S., Páll, D., & Zrínyi, M. (2022). Discriminating Low to High Adherent Type 2 Patients with Diabetes by Glycosylated Hemoglobin A1c, Eating Self-Efficacy and Other Psychosocial Determinants: Difference Between Patient and Physician Adherence Models. *Patient Preference and Adherence, Volume 16*, 1405–1414. https://doi.org/10.2147/PPA.S361413

Madran, D. M., & Jassim, A. H. (2022). Self-efficacy and its relationship to self-care among type II diabetic patients. *International Journal of Health Sciences*, 15199–15208. https://doi.org/10.53730/ijhs.v6nS2.8851

Malini, H., Yeni, F., Pratiwi, C. A., & Lenggogeni, D. P. (2020). Associated Factors of Self-Management in Type 2 Diabetes Mellitus at Community Health Center. *Jurnal Keperawatan Soedirman, 15*(2). https://doi.org/10.20884/1.jks.2020.15.2.1229

Mannan, A., Hasan, Md. M., Akter, F., Rana, Md. M., Chowdhury, N. A., Rawal, L. B., & Biswas, T. (2021). Factors associated with low adherence to medication among patients with type 2 diabetes at different healthcare facilities in southern Bangladesh. *Global Health Action, 14*(1), 1872895. https://doi.org/10.1080/16549716.2021.1872895

Moura, M., & Neves, R. (2025). Methodology. In M. Moura & R. Neves, *Using Fundamental Analysis and an Ensemble of Classifier Models Along with a Risk-Off Filter to Select Outperforming Companies* (pp. 27–52). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-62061-4_3

Pramesti, T. A., Saraswati, D. A. L., & Wardhana, Z. F. (2021). Hubungan antara self efficacy dengan kepatuhan minum obat hipoglikemik oral pada penderita dm tipe ii: Relationship between self efficacy with medication adherence in patients with type ii dm. *Bali Medika Jurnal, 8*(3), 239–252. https://doi.org/10.36376/bmj.v8i3.165

Putri, N. A., & Suzalin, F. (2023). Model Intervensi Kepatuhan Minum Obat Dan Kontrol Gula Darah Pada Pasien Diabetes Melitus Tipe 2: Systematic Review. *JKPharm Jurnal Kesehatan Farmasi, 5*(1), 23–39. https://doi.org/10.36086/jkpharm.v5i1.1537

Rahman, M., Nakamura, K., Hasan, S. M. M., Seino, K., & Mostofa, G. (2020). Mediators of the association between low socioeconomic status and poor glycemic control among type 2 diabetics in Bangladesh. *Scientific Reports, 10*(1), 6690. https://doi.org/10.1038/s41598-020-63253-8

Reisi, M., Fazeli, H., Mahmoodi, M., & Javadzadeh, H. (2021). Application of the Social Cognitive Theory to Predict Self-Care Behavior among Type 2 Diabetes Patients with Limited Health Literacy. *Journal of Health Literacy, 6*(2). https://doi.org/10.22038/jhl.2021.57503.1161

Shiyanbola, O. O., Maurer, M. A., Virrueta, N., Walbrandt Pigarelli, D. L., Huang, Y.-M., Unni, E. J., & Smith, P. D. (2022). Feasibility of a Randomized Controlled Mixed Methods Trial to Address Health Literacy, Beliefs, Medication Adherence, and Self-Efficacy (ADHERE) in a Clinical Pharmacist-Led Clinic. *Patient Preference and Adherence, Volume 16*, 679–696. https://doi.org/10.2147/PPA.S349258

Shrestha, K. D., Kc, T., & Ghimire, R. (2020). Adherence to Therapeutic Regimen in Diabetic Patients Attending a Tertiary Level Hospital. *Journal of Institute of Medicine Nepal, 42*(2), 47–53. https://doi.org/10.3126/jiom.v42i2.37537

Wibowo, M. I. N. A., Yasin, N. M., Kristina, S. A., & Prabandari, Y. S. (2022). Exploring of Determinants Factors of Anti-Diabetic Medication Adherence in Several Regions of Asia – A Systematic Review. *Patient Preference and Adherence, Volume 16*, 197–215. https://doi.org/10.2147/PPA.S347079

Wu, J., Shen, J., Tao, Z., Song, Z., & Chen, Z.-L. (2023). Self-Efficacy as Moderator and Mediator Between Medication Beliefs and Adherence in Elderly Patients with Type 2 Diabetes. *Patient Preference and Adherence, Volume 17*, 217–226. https://doi.org/10.2147/PPA.S382362

Xie, Z., Liu, K., Or, C., Chen, J., Yan, M., & Wang, H. (2020). An examination of the socio-demographic correlates of patient adherence to self-management behaviors and the mediating roles of health attitudes and self-efficacy among patients with coexisting type 2 diabetes and hypertension. *BMC Public Health, 20*(1), 1227. https://doi.org/10.1186/s12889-020-09274-4

Zang, L. (2023). Analysis of the Mediating Effect of Self-Efficacy on Self-Regulation Fatigue and Self-Management Behavior in T2DM Patients. *Journal of Innovations in Medical Research, 2*(2), 16–21. https://doi.org/10.56397/JIMR/2023.02.03

Zhang, Y., & Chen, X. (2022). Methodology. In Y. Zhang & X. Chen, *Application-Oriented Higher Education* (pp. 83–110). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-2647-1_6