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Adapting Integrated Behavioural Activation and Physical Activity Intervention for Women with Depression and Diabetes Multimorbidity (BE-ACTIVE)

Abstract

Background: Integrated Behavioural Activation and physical activity interventions have the potential to tackle depression and diabetes multimorbidity. However, such interventions, developed in high-income countries, may need to be adapted and contextualized to be appropriate for use in low and middle-income countries. The objective of this study was to adapt an Integrated Behavioural Activation and physical activity intervention to tailor it for women with depression and type 2 diabetes mellitus living in Pakistan.

Methods: Two co-design informed workshops with key stakeholders (people with depression and type 2 diabetes mellitus, carers, healthcare workers, and social workers) were conducted. The purpose of workshop 1 was to identify facilitators and barriers to the delivery of the original Integrated Behavioural Activation and physical activity intervention (BAcPAc) intervention as per the domains of the Bernal cultural adaptation framework (language, persons, metaphors, content, concepts, goals, methods, context). Based on the findings of workshop 1, changes were made to the original intervention. Stirman's adaptation classification was used to map the changes. In workshop 2, participants' feedback was used to refine the contents of the adapted intervention.

Results: A total of 21 participants attended workshop 1, while 16 participants attended workshop 2. Barriers and enablers were identified in all domains of the Bernal's framework. Changes were made in the language, pictures/illustrations, intervention dose and delivery, training intensity, and evaluation measures.

Conclusion: This study produced a theoretically informed, culturally adapted Integrated Behavioural Activation and physical activity intervention for women with depression and type 2 diabetes mellitus (BE-ACTIVE) living in Pakistan.

Key words: Behavioural Activation, Depression, Diabetes Mellitus Type 2, Physical activity, Women

Depression and type 2 diabetes mellitus (T2DM) multimorbidity is highly prevalent as 14.5% to 28% of people with T2DM suffer from depression (Farooqi et al., 2022; Khaledi et al., 2019; Wang et al., 2019). Evidence suggests that women with T2DM have a higher prevalence of depression compared to their male counterparts (Barbosa et al., 2022; Pan et al., 2010). Globally, the prevalence of depression among women with T2DM ranges from 24% to 34%, while its prevalence among men ranges from 15.8% to 23% (Farooqi et al., 2022; Khaledi et al., 2019; Wang et al., 2019). In low and middle-income countries (LMICs), although the prevalence of depression among women with T2DM has not been studied, it is reported that estimates of depression prevalence might be considerably higher in this population compared to women without T2DM (Mendenhall & Weaver, 2014).

Management of co-occurring depression and T2DM typically involves a combination of pharmacological treatment, psychological therapies, and lifestyle-based strategies, delivered within ongoing clinical care. Physical activity represents one component of this broader management approach and is often recommended alongside medication adherence, dietary modification, and psychosocial support (Kandola et al., 2019). Physical activity has been shown to not only improve glycaemic control but also to be effective in managing depression (Kandola et al., 2019; Narita et al., 2019; van der Feltz-Cornelis et al., 2021). However, women with depression and T2DM mostly remain physically inactive (Koopmans et al., 2009; Lee et al., 2020). This is a particular challenge in Pakistan where due to cultural values, women face additional barriers to physical activity compared to men, including limited autonomy to engage in outdoor activities, lack of gender-appropriate physical activity facilities, domestic workload, and concerns related to safety and social acceptability (Arsh et al., 2023)). According to conservative estimates, 27% to 80% of women in Pakistan are physically inactive (Guthold et al.,

2008; Hoodbhoy et al., 2018; Mawani, 2017; Memon et al., 2018; Pengpid et al., 2015; Samir et al., 2011). While the statistics regarding physical inactivity among women with T2DM and depression living in Pakistan are not available, it is likely that physical inactivity is significantly higher in this population compared to the level of physical inactivity observed in the general population.

Literature suggests that the use of rewarding activities can improve people's motivation and compliance to adhere to specific exercise protocols (Bullard et al., 2019). Behavioural Activation (BA) is based on identifying and engaging in rewarding activities to improve symptoms of depression (Janssen et al., 2021; Turner & Leach, 2012). While increasing daily activities is the goal of BA, it does not specifically employ strategies to promote physical activity. With a slight change in the emphasis, there is a possibility to focus BA on physical activity. This can be achieved by selective reinforcement of activities that demand high energy expenditure (Michie et al., 2009; Pentecost et al., 2015). Adapting BA to focus specifically on physical activity could potentially improve uptake of physical activity in women with depression and T2DM, leading to better glycaemic control, in addition to improving depression symptoms. Some studies have either discussed the possibility of using BA along with physical activity (Farrand et al., 2014; Lambert et al., 2017; Schneider et al., 2011; Turner et al., 2019), or evaluated the feasibility of combined BA and physical activity interventions for the management of depression (Lambert et al., 2018; Pentecost et al., 2015; Schneider et al., 2016). The only study available in the literature that specifically assessed the effects of a combined BA and physical activity intervention for the management of depression in people with T2DM was conducted by Schneider et al. (2011, 2016), although they did not describe the intervention development process. The development of an intervention to integrate BA with physical activity

for adults with depression has previously been described by Farrand et al. (2014), followed by a pilot RCT to assess the feasibility and acceptability of the intervention (Farrand et al., 2014; Pentecost et al., 2015). The feasibility trial suggested that the integrated BA and physical activity (BAcPAc) intervention is feasible and acceptable.

Farrand and his colleagues derived principles from self-determination theory to adapt the BA protocol proposed by Richards (2010) to emphasize physical activity (Richards, 2010). According to self-determination theory, behaviour results from intrinsic motivation (the pleasure one experiences when engaging in a behaviour). Self-determination theory argues that intrinsic motivation can be achieved if three core psychological needs (autonomy, competence, and relatedness) are attained. Self-determination theory emphasizes that meeting these psychological needs is crucial for the initiation and maintenance of behaviour. The fundamental concept of self-determination theory is that a person's psychological needs must be met (autonomy, competence, and relatedness) within an activity for them to be optimally motivated to engage (Deci & Ryan, 2000, 2008, 2013; Ryan et al., 2009). Evidence suggests that interventions based on self-determination theory which focus on patient preferences could result in more enduring changes in physical activity by fostering autonomy and concentrating on more enduring, intrinsically driven changes (Nyström et al., 2015; Teixeira et al., 2012). Lambert et al. (2017) adapted the concepts of Farrand et al. (2014) to develop a web-based BA and physical activity intervention (Lambert et al., 2017). They also conducted a pilot RCT and reported that a web-based BA and physical activity intervention is feasible for adults with depression (Lambert et al., 2018).

Given the evidence of emerging effectiveness for this approach, it may be plausible to integrate BA with physical activity. It is evident that integrated BA and physical activity

interventions have the potential to promote physical activity and thus tackle depression and T2DM multimorbidity (Lambert et al., 2018; Pentecost et al., 2015; Schneider et al., 2016). However, to date, this work has largely been carried out in high-income countries and may not readily translate to LMIC contexts due to differences in healthcare infrastructure, availability of trained mental health professionals, resource constraints, literacy levels, and sociocultural norms influencing health behaviours. Previous studies have shown that BA intervention developed in high-income countries require substantial adaptation to be feasible and acceptable in LMICs, particularly for people with multimorbid depression and type 2 diabetes (Aslam et al., 2022; Zavala et al., 2023).Therefore, integrated BA and physical activity interventions developed in high-income countries need to be adapted and contextualized in LMICs. This is particularly important for women with depression and T2DM living in Pakistan, as existing BA and physical activity interventions may not be feasible due to gender-specific roles, competing domestic responsibilities, financial constraints, and reliance on family members for healthcare-related decision-making and attendance. Therefore, the current study was designed to adapt an integrated BA and physical activity intervention for women with depression and T2DM living in Pakistan.

Methods

Intervention for Adaptation

BAcPAc, developed by Farrand et al. (2014) is the only theoretically informed intervention we found that integrates BA and physical activity for people with depression (Farrand et al., 2014). Therefore, we chose to adapt this intervention for women with depression and T2DM in Pakistan.

Rather than developing a novel intervention de novo, we chose to adapt the existing BAcPAc intervention because it is theoretically grounded in BA and self-determination theory, both of which have strong evidence base for the management of depression and promotion of physical activity. Implementation science literature suggests that adapting theory-based interventions can be more efficient and scalable than developing entirely new interventions, provided that core mechanisms of action are preserved and contextual adaptations are systematically undertaken (Kilbourne et al., 2024; Moore et al., 2021).

Adaptation Framework

The Bernal's cultural adaptation framework was used to guide the choice of intervention aspects that needed adaptation (Bernal et al., 1995). Bernal's cultural adaptation framework provides a systematic approach to adapting psychosocial interventions by examining eight interrelated domains: language, persons, metaphors, content, concepts, goals, methods, and context. The framework emphasises ecological validity by ensuring that interventions are not only linguistically appropriate but also aligned with the cultural values, social norms, and contextual realities of the target population. This framework has been widely used in the cultural adaptation of mental health interventions, particularly in low-resource and ethnically diverse settings. The adaptation matrix from the Stirman adaptation classification was used to map and describe the changes made to the original intervention (Stirman et al., 2013)). The framework proposed by Stirman et al. was used to systematically classify and document the types and levels of modifications made to the original intervention. This framework distinguishes between content modifications (e.g., changes to intervention materials, examples, or dose) and contextual modifications (e.g., changes to delivery agents, setting, or target population). The use of the Stirman framework enhanced transparency and reproducibility by clearly documenting how the

intervention was modified while retaining its theoretical integrity, and it allowed us to distinguish between adaptations made to improve cultural relevance and those made to enhance feasibility within the local healthcare system. An initial logic model was developed to visualize the process of intervention adaptation (Figure 1). {PLACE FIGURE 1 HERE}

Participants

Patient participants, carers, healthcare staff, and social workers/representatives of the public were recruited into the consultative workshops via purposive and snow-ball sampling. Patient-Participants were individuals, aged ≥ 18 years, with a physician-confirmed diagnosis of T2DM, and a diagnosis of major depressive disorder as defined by the Structured Clinical Interview for DSM-V disorders and who were able to provide informed consent. Carers were individuals, aged ≥ 18 years, nominated by the patient participants as a carer, who provide care to a family member with the clinical diagnosis of depression and T2DM, and who could provide informed consent. Healthcare staff were Diabetes specialists, mental health specialists (psychiatrists/psychologists), and other healthcare staff and managers (nutritionists, and paramedical staff), involved in primary or secondary care of people with depression and T2DM, were eligible. In addition, professionals with relevant knowledge or experience of physical activity interventions (such as physical therapists and public health experts) were eligible. Social Workers and representatives of the public included individuals aged ≥ 18 years, working for the social welfare of the community.

Participants Identification

Participants were identified from three main sources: Individuals (people with depression and T2DM, their carers, and healthcare staff) who participated in the qualitative study (Arsh et al., 2023), conducted prior to this study, were invited to join the consultative workshops. These

individuals were invited to the current study to gain insights from their experiences for the adaptation of integrated BA and physical activity intervention. Patients and healthcare staff who participated in the DiaDeM programme were also invited to join the consultative workshops. The DiaDeM programme was a National Institute of Health Research funded research project that aimed to develop and test a culturally appropriate approach to the recognition and treatment of depression in people with diabetes in Bangladesh and Pakistan, based on BA (Aslam et al., 2022; Zavala et al., 2023). These individuals had either received or delivered BA, so they were targeted to gain insights from their experiences. New participants, who did not take part in the qualitative study, or the DiaDeM programme were also recruited. They were identified with the help of participants who either participated in the qualitative study or in the DiaDeM study.

Recruitment

The research team provided leaflets and participant information sheets, containing information about the research study and information on how to get involved in the study to potential participants. A contact number and email address were provided for the participants to use if they wished to participate. A self-addressed envelope was also provided which potential participants may return if they wish to participate in the study but do not want to call or email. When potential participants made contact, a researcher scheduled meetings with them to re-confirm their eligibility and answer any queries about the study. Written informed consent (either thumbprints or signatures) was obtained on the day of the workshop before the commencement of the workshop by the workshop facilitator.

Data Collection

Consultative workshops were selected as the primary adaptation method in line with implementation science and co-design literature, which emphasises stakeholder engagement,

collective sense-making, and iterative refinement as key mechanisms for producing contextually appropriate and implementable interventions (de Boer et al., 2025; Peters et al., 2024).

Two consultative workshops were conducted at Khyber Medical University Peshawar in May and June 2023. Each workshop lasted 4 hours with a 30-minute break after the first 120 minutes. Each workshop began with a formal welcome to the participants followed by the introduction of facilitators and participants. The aims and objectives of the workshops and a summary of the intervention adaptation process were communicated to the participants. The content and activities of the workshop were then presented. Workshop discussions were audio-recorded and documented through detailed facilitator notes and written materials (e.g., flipcharts and worksheets). These data were used to capture illustrative examples of participant views to support interpretation of the findings.

Workshop 1

The objective of workshop 1 was to identify changes needed in the original intervention. Hard copies of the BAcPAc intervention were provided to participants. The workshop facilitators presented the core components of original BAcPAc intervention to the participants and explained the need for an adapted intervention. Participants were given enough time to review and understand the core components of the original intervention. Four personas were presented. Personas were used as an evidence-informed design tool to support structured discussion and to ensure that adaptation decisions considered a range of contextual and individual-level variations. The four personas were developed by the research team using data from a prior intervention adaptation study conducted with people with depression and T2DM, carers, and healthcare professionals in Pakistan. Persona characteristics were purposively varied to reflect key

dimensions relevant to intervention feasibility, including age, marital status, number of children, rural versus urban residence, socioeconomic status, and level of family support.

The workshop participants were divided into four groups and one persona was assigned to each group. Each group was asked to identify factors as per the domains of Bernal's framework (language, persons, metaphors, content, concepts, goals, methods, context), specific to the persona that could affect participation and/or adherence to the original BAcPAc intervention. A 30-minute break was announced after completion of this activity. During break time, workshop facilitators displayed the personas along with the factors identified by each group for their assigned persona. After break time, participants were requested to suggest changes that could be made to the original BAcPAc intervention to overcome constraints identified by participants for the personas. The suggestions presented by participants were noted. The factors identified by participants that could affect participation and/or adherence to the original BAcPAc intervention and the suggestions to overcome these constraints were compiled according to Bernal's framework. The changes in the original BAcPAc intervention proposed by workshop participants were made. The Stirman adaptation classification was used to map the changes made to the original intervention (Stirman et al., 2013).

Workshop 2

The objective of the 2nd workshop was to present the adapted intervention materials to the stakeholders and refine it. Before the workshop, the adapted intervention materials were provided to the participants of workshop 1 (either in soft copy or hard copy depending on participant preference) for review and feedback. Sections of the adapted intervention were presented to participants of workshop 2, and they were asked to give their feedback after each

section of the presentation. This feedback was used to refine and finalise the adapted intervention materials. The adapted intervention was named as "BE-ACTIVE" intervention.

Key barriers, facilitators, and suggested adaptations were first identified through review of workshop materials and discussion summaries. These were then grouped and mapped onto the domains of Bernal cultural adaptation framework to organise findings systematically (Bernal et al., 1995). Redundant or overlapping points were consolidated through team discussion, while distinct perspectives were retained to reflect the range of views expressed. Given the consultative and formative purpose of the workshops, findings are presented as aggregated summaries rather than stratified analyses, with emphasis on identifying shared priorities to inform intervention adaptation.

Ethics Approval

Ethics approval was obtained from the Health Sciences Research Governance Committee University of York United Kingdom (Reference No. HSRGC/2022/498/A, dated 6th May 2022) and Ethics Board of Khyber Medical University Pakistan (Reference No. DIR/KMU-EB/CB/00115, dated 23rd May 2022).

Results

Participants

A total of 21 participants attended the first consultative workshop including 7 patient participants (5 female and 2 male), 9 healthcare staff (5 female and 4 male), 2 carers (1 female and 1 male), and 3 social workers/representatives of public (1 female and 2 male) **(Table 1)**.

{PLACE TABLE 1 HERE}

The second workshop was attended by 16 participants including 6 patient participants (5 female and 1 male), 7 healthcare staff (4 female and 3 male), 2 carers (1 female and 1 male), and 1 female social worker **(Table 2)**. {PLACE TABLE 2 HERE}

Intervention Adaptation

The original BAcPAc intervention comprised of a self-help workbook, training manual and case studies (Farrand et al., 2014; Pentecost et al., 2015).

In line with implementation science guidance, the adaptation process was informed by the distinction between core components of the intervention and elements considered part of the adaptable periphery. Core components were defined as those essential to the intervention's theoretical mechanisms of action, including behavioural activation principles, the use of activity monitoring and scheduling, goal setting, and the emphasis on increasing engagement in rewarding activities with a focus on physical activity. Elements considered adaptable included language, examples, session structure and dose, delivery format, intervention materials, and the type of personnel delivering the intervention. This approach aligns with implementation science literature emphasising the importance of preserving core intervention functions while adapting form and delivery to enhance feasibility, acceptability, and sustainability in new contexts.

The participants carried out a detailed review of the intervention to identify barriers and enablers to delivery within the domains of the Bernal cultural adaptation framework **(Table 3)**. {PLACE TABLE 3 HERE}

Language

The original BAcPAc intervention was delivered in the English language and therefore it was not possible to use it in Pakistani settings. However, participants highlighted the possibility of translating the intervention content into the Urdu language. Participants emphasized that

written Urdu is much easier to understand as compared to other local languages (such as Pashto), therefore, the consensus was that the intervention materials should be translated into Urdu. Intervention materials were translated from English into Urdu using a standard forward–backward translation process. Initial translation was conducted by bilingual researchers familiar with BA and health terminology, followed by independent back-translation. Discrepancies were discussed and resolved by the research team, and the translated materials were reviewed during to ensure clarity, cultural relevance, and comprehensibility for the target population.

Persons (Patient and Therapist)

In the BAcPAc intervention, there was no consideration of the patient's and therapist's gender, however, the participants in the consultative workshops felt that women patients and their carers might prefer female therapists. Workshop participants highlighted the comparatively negative attitude of patients and their carers towards healthcare staff other than the treating physician (diabetologist). Participants explained that these attitudes were largely shaped by limited public understanding of the training and roles of non-physician healthcare staff, coupled with a strong cultural preference for physician-led care. Previous experiences in which advice from non-physician staff was perceived as inconsistent or lacking authority further contributed to reduced trust and engagement.

Metaphors

The original intervention did not include signs or symbols in the self-help workbook. Participants suggested providing signs and symbols to guide patients and their carers. For example, when explaining routine activities, the symbol of a clock can be incorporated in the intervention material to denote 24-hour routine activities. Similarly, to explain pleasurable activities, a smiley emoji can be used. Participants highlighted that symbols and visual cues were

particularly important due to varying literacy levels and difficulties in processing lengthy written information among patients with depression. Visual symbols were viewed as a practical way to simplify complex concepts, improve comprehension, and support independent use of the intervention materials.

Content

Participants highlighted that the case studies, activities, images, and illustrations used in the original intervention are not appropriate for Pakistani settings. Moreover, participants were concerned that patients may face difficulties reading and understanding lengthy written scripts, instructions, and explanations present in the original intervention manuals.

Participants discussed that case studies specific to local context need to be developed. Similarly, participants emphasized the addition of cultural and religious-specific images and illustrations in the intervention manual. Moreover, participants recognised the need to replace certain textual information with images and illustrations.

Concepts

Participants highlighted that patients and their carers often have limited awareness about the positive effects of physical activity on mental health and this might be a barrier to intervention delivery. Participants added that generally people consider rest as more beneficial for people with depression and there could be concerns that physical activities might aggravate their depression symptoms. Nonetheless, participants stated that patients and their carers are generally aware of the positive effects of physical activity on physical health (weight loss, body appearance, general health) and thus this could help promote engagement in physical activity.

Goals

The goal of both original BAcPAc intervention and the adapted intervention was to promote physical activity and reduce depressive symptoms. In addition, the adapted intervention also aims to manage blood glucose levels in women with depression and T2DM.

Method

The BAcPAc intervention was delivered by psychological well-being practitioners. In the UK, psychological well-being practitioners treat and support individuals with common mental health issues such as depression and anxiety. Psychological well-being practitioners receive British Psychological Society accredited training (45 days of academic work alongside supervised practice for one year) based upon the curriculum developed for the Improving Access to Psychological Therapies (IAPT) program (NHS, 2023; Richards, 2009). The psychological well-being practitioners involved in delivering BAcPAc intervention received one day of additional training related to BAcPAc intervention. Participants discussed different possibilities for delivering the adapted intervention in the diabetes care facilities because there is no psychological well-being practitioners role in Pakistan. Similarly, other mental health workers are generally not available in diabetes care facilities. In addition to this, participants highlighted that patients might face difficulties in visiting healthcare facilities for treatment sessions due to financial constraints, long distances to travel and restrictions to solo travel of women with depression and T2DM. Furthermore, participants emphasized that patients might not be able to fill their worksheets without assistance.

Workshop participants discussed the possibility of training non-mental health specialists who would be available at diabetes care facilities such as nutritionists and nurses to deliver the adapted intervention. Participants emphasized that one-day training might be insufficient to

understand the intervention components, therefore non-mental health specialists who are supposed to deliver the adapted intervention should receive at least 3 days of face-to-face training. Participants also advised that follow-up intervention sessions need to be scheduled alongside follow-up diabetic check-ups and these follow-up sessions need to be flexible to accommodate patient needs. Similarly, participants recommended involving family members/ friends to assist patients in completing their worksheets and helping them achieve the goals of the intervention.

Context

Participants highlighted that patients might be dependent on carers as in Pakistan women often do not travel alone. Patients might also need permission from husbands/ other male family members to attend sessions. Participants discussed the possibility of the therapist meeting with carers/family members. Participants highlighted that carers could support therapists in the successful delivery of the intervention and thus it may be necessary to involve family members/carers along with the patient.

Intervention Production

Content Modifications

The original intervention was designed for adults with depression only, therefore, we added T2DM along with depression when referring to the target population. Moreover, activities mentioned in the case studies were relevant to people in the UK, therefore, we changed the examples of activities in the case studies to be culturally relevant, particularly we focused on activities that are commonly performed by women in Pakistan such as performing household chores, children's care, visiting neighbours and relatives, care for cattle, helping male partners in farming related activities, gardening in home, and walk within home or in open space. The

adapted intervention was named the BE-ACTIVE intervention **(Table 4)**. {PLACE TABLE 4 HERE}

In the BAcPAc intervention manual, there were only a few pictures of people from the UK on the initial pages of the booklet. In addition to replacing the existing pictures, we included some additional pictures presenting the local context to illustrate the activities pictorially. We have added symbols and emojis to the self-help workbook to guide participants about certain components. Moreover, in the original intervention manual, a visual scale from 0 to 6 was used to evaluate difficulties in performing activities, however, we replaced it with a visual scale from 0 to 10. Participants highlighted that it would be easier to explain a 0 to 10 visual scale to patients and their carers.

The original intervention consisted of one assessment session, followed by 12 support sessions. Each session was 25 to 35 minutes. The adapted intervention consists of one assessment session followed by 5 support sessions and each session is 30 to 45 minutes. The six sessions will be delivered in 6 to 12 weeks duration to ensure flexibility in the intervention sessions. Participants highlighted that 12 sessions might not be feasible for the target population. They added that DiaDeM (BA intervention for people with depression and T2DM delivered in Pakistan and Bangladesh (Aslam et al., 2022; Zavala et al., 2023)) and BEACON (BA intervention for people with non-communicable diseases delivered in India (Zainab et al., 2022)) comprised 6 interventions sessions. Participants anticipated that 6 sessions will be feasible for patients, therefore they suggested that the adapted intervention should have 6 intervention sessions.

Contextual Modifications

The original intervention was focused on individuals with depression living in the UK while the adapted intervention is focused on women with depression and T2DM living in Pakistan. The original intervention manual was lengthy with most of the instructions in written format. In the adapted intervention, the self-help materials are more brief with increased verbal input from the therapists. Where possible, written text is replaced with images and illustrations. Similarly, in the original intervention, instructions about support from family/friends were mentioned only a few times. In the adapted intervention, a stronger social support component is advised. The stronger social support component involved actively encouraging the involvement of a trusted family member or friend throughout the intervention. This included supporting attendance at sessions, assisting with completion of worksheets, reinforcing agreed activity goals, and helping to address practical and cultural barriers to participation. Family members were also encouraged to provide verbal encouragement and facilitate opportunities for physical activity within the home or immediate environment. This component was introduced in recognition of women's reliance on family support for healthcare engagement and decision-making in the local context.

The original intervention was delivered by trained psychological well-being practitioners; however, the adapted intervention will be delivered by non-mental health specialists working in diabetes care services who will be trained on the delivery of the adapted intervention. Moreover, an initial verbal/written description of the intervention will be provided by the treating physician, who will also be responsible for referring patients to the intervention. Workshop participants acknowledged that physical activity is not routinely prescribed or referred for by physicians or non-physician healthcare workers, and that patients are less likely to engage with such advice in

the absence of explicit physician endorsement. To address this barrier, participants suggested embedding brief, low-burden physician endorsement of the intervention within routine diabetes consultations, such as verbal encouragement or written confirmation that participation was recommended as part of diabetes care.

Training and Evaluation Process

In the original intervention, trained psychological well-being practitioners received one day of training. For the adapted intervention, non-mental health specialists will receive 3 days of face-to-face training. Moreover, relevant reading materials and/or online resources will be provided to therapists to gain insights about concepts of BA, physical activity and original BAcPAc intervention. Adaptation of the intervention for delivery by non-mental health specialists focused on modifying intervention materials, session structure, and training requirements to align with the skills and roles of staff working in diabetes care services. These adaptations were informed by stakeholder input during the consultative workshops; however, detailed development and testing of the training curriculum and supervision model for non-mental health specialists is planned as part of subsequent feasibility work.

Physical activity and depression were the main outcomes for the original intervention while we will also evaluate glycaemic control, in addition to physical activity and depression. Moreover, after the treatment, we will also evaluate activities in which patients face difficulties at the start of the treatment, to determine whether engagement in physical activity becomes easier after receiving the intervention.

Discussion

BAcPAc, an integrated BA and physical activity intervention was adapted for women with depression and T2DM living in Pakistan. Two consultative workshops were conducted to

facilitate the process of intervention adaptation. Modifications were made to the original intervention based on the findings of the consultative workshops, to make the intervention culturally appropriate for the target population. The changes made during the adaptation process were mapped according to the Adaptation matrix from the Stirman adaptation classification (Stirman et al., 2013). The adapted intervention was named the BE-ACTIVE intervention. The workshop participants emphasised that the uptake of the adapted intervention might depend on the involvement of family members and the treating physicians in the intervention delivery.

The main reasons for including family members and carers in the delivery of the adapted intervention are the dependence of women in Pakistan on family members for treatment-related decisions, and difficulties women experience travelling alone to healthcare facilities. In Pakistan, important decisions are usually made by male members of the family and some reports showed that even women's health-related decisions are usually made by male family members (Memon et al., 2023; Rowther et al., 2020; Tariq et al., 2022). On average, 48% of women in Pakistan have no say in decisions relating to their healthcare. Compared to urban areas, women in rural areas are 1.3 times more likely to report having no say in decisions regarding their health matters. The statistics are more alarming for women of Pashtun ethnicity because the report revealed that about 65% of women in the Pashtun belt had no right to make decisions about their health (Ilyas, 2018; Ismail & Dagia, 2018). Despite improvements in legislation related to women's rights in the last two decades, a major proportion of women remain deprived of their fundamental right to make decisions about their healthcare (Habib et al., 2021; Hussain et al., 2019). That might be one of the reasons that Pakistan was ranked 145 out of 146 countries in a recent gender gap report (WEF, 2022). The fact that women rely on family for treatment-related decisions is of utmost importance as it shows that uptake of the intervention is directly dependent

on family involvement. Therefore, the involvement of family members and their carers is essential in the delivery of the adapted intervention. Despite the risk of reinforcing the inequalities for women in decision-making about their health by involving male family members, focusing on depression in women and women's participation in physical activity should contribute to addressing some of these health disparities. There may also be potential to empower women through the intervention to negotiate with family members. This empowerment was not introduced as a standalone intervention component, rather, it is expected to emerge indirectly through BA processes that emphasise goal-setting, problem-solving, and gradual mastery of activities. Involving family members in structured discussions around activity goals may also provide women with opportunities to articulate their needs and negotiate support within existing household dynamics.

There is high-quality evidence that supports the inclusion of family members in the treatment of people with depression and T2DM. Some of the benefits presented in the literature for including family members in the treatment of people with depression and T2DM include assistance in dietary control, prevention of stigma and isolation, and assistance in the identification of condition-specific symptoms (Bukhsh et al., 2020; Gilliss et al., 2019; Gupta et al., 2019; Mayberry et al., 2021). There is agreement between the findings of the current study and the literature that family members need to be considered while designing, delivering, and upscaling the intervention for people with depression and T2DM. In addition to the factors presented above, family members can support people with depression and T2DM by interpreting intervention materials and supporting them to effectively use the intervention. Similarly, family members can facilitate communication between patients and therapists.

During the consultative workshops, participants particularly emphasized the importance of the role of treating physicians in intervention delivery. From the findings of the current study, it appeared that generally people with depression and T2DM and their carers follow the advice and prescription of the treating physician while having a more negative attitude towards other healthcare professionals (might be due to limited understanding of their training and role). Participants added that people with depression and T2DM and their carers do not visit other healthcare professionals, follow their instructions, or take their advice seriously until and unless they are referred by the treating physician. During the workshop, participants discussed that treating physicians have busy schedules and due to workload and workforce shortages, it will be implausible for treating physicians to deliver a physical activity intervention in clinical settings. However, keeping in mind the importance of the treating physician's advice for the uptake of intervention, it was incorporated in the intervention material that the treating physician will provide a verbal/written description of the intervention and refer patients to the intervention. The role of healthcare professionals in physical activity promotion to a broad segment of the population is evident from the literature (Brooks et al., 2019; Cantwell et al., 2018; Lobelo et al., 2018; Netherway et al., 2021; Vishnubala & Pringle, 2021). However, most healthcare professionals, particularly busy clinicians do not formally advise and/or prescribe physical activity in routine clinical practice. Despite this, from the participant's discussion during the workshop, it appeared that the sustainability of the adapted intervention is linked with referral to the intervention by the treating physicians. Therefore, the treating physician's verbal and/or written advice/prescription is particularly mentioned in the adapted intervention.

This study also contributes to the application and understanding of the Bernal cultural adaptation framework in the context of complex multimorbidity and low-resource settings. While

the framework provided a useful structure to systematically identify adaptation needs across domains, our findings suggest that certain domains, particularly context, persons, and methods, were especially influential in shaping adaptation decisions. In this setting, cultural adaptation extended beyond language and content to include health system constraints, gender norms, and reliance on family support, highlighting the interconnected nature of cultural and structural factors. The prominence of family involvement and physician endorsement suggests that adaptation in LMIC contexts may require greater emphasis on social and institutional dynamics than is typically foregrounded.

The study has important implications. At present, physical activity is not formally advised or prescribed in routine clinical practice. Healthcare professionals including treating physicians, other medical doctors, nurses, nutritionists, and paramedics can be trained to deliver the adapted intervention. Moreover, there is the possibility to train lay workers (non-healthcare professionals) for the delivery of the adapted intervention, but this needs further exploration as the focus of the current study was on healthcare professionals who are already present in the diabetes care facilities. The adapted intervention focuses on women with depression and T2DM, however, there is the possibility to further adapt this intervention for other populations. The current study provides preliminary work related to the adaptation of an BA and physical activity intervention, however, we need more evidence to guide policy and practice. There is a need to conduct clinical trials to test the feasibility, acceptance, and effectiveness of the adapted intervention. Moreover, the economic implications of the adapted intervention need to be assessed.

Limitations

The current study has several limitations. First limitation relates to participant sampling. Some participants were recruited through snowball sampling and from previous research studies and intervention programmes, meaning they may have had prior exposure to BA or intervention research. As a result, their views may not fully represent those of individuals with no prior experience of structured interventions, which may limit the generalisability of the findings. Moreover, due to time constraints and resource limitations, we conducted only two consultative workshops. Similarly, as an individual-level intervention, the adapted intervention cannot directly address upstream structural factors that constrain physical activity, such as unsafe neighbourhoods, limited public spaces, or healthcare system limitations. These factors may have a greater influence on physical activity and disease management than individual motivation alone. Despite these limitations, the study involved key stakeholders with diverse backgrounds in the adaptation process. Similarly, in-between workshops, we provided the adapted intervention materials to the stakeholders for review and feedback. Together with the feedback received in-between workshops, we think we were able to identify the most salient adaptations needed. The use of evidence-informed persona to facilitate the workshop discussions helped to orientate participants to the task. Insights provided by the wide range of stakeholders assisted in identifying factors that can affect the feasibility of the intervention in real-world practice. Similarly, the utilization of the cultural adaptation framework assisted in systematically identifying aspects of the intervention to tailor it to the cultural needs of women with depression and T2DM in the region. The adaptations reported in this paper represent a foundational phase in an iterative adaptation process, providing a necessary platform for subsequent feasibility testing and further refinement prior to large-scale implementation.

Conclusion

The study reports the cultural adaptation of an integrated BA and physical activity intervention for women with depression and T2DM living in Pakistan. The adapted intervention was named the BE-ACTIVE intervention. The adapted intervention is novel in attempting to offer a solution for physical inactivity among women with depression and T2DM. However, there is a need to assess the feasibility of the adapted intervention and its effectiveness in improving physical activity levels, depressive symptoms, and glycaemic control.

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Figure 1

Logic model for adaptation of integrated Behavioural Activation and Physical Activity intervention

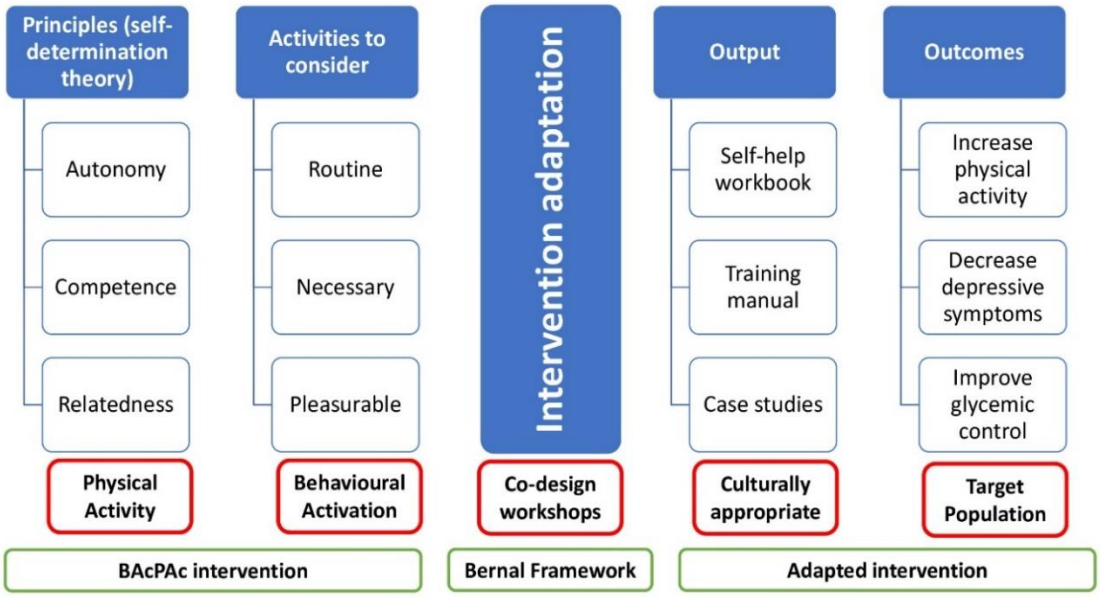

Table 1

Demographic information of workshop 1 participants (n=21)

S.No.	Role	Age (years)	Gender	Education	Occupation/ speciality
1	Patient-participant	51	Male	Intermediate (12 years of education)	School Teacher
2	Patient-participant	56	Female	No formal education	Housewife
3	Patient-participant	43	Female	Master in Islamic Studies (16 years of education)	School Teacher
4	Patient-participant	48	Female	MPhil in English Literature (18 years of education)	Assistant Professor
5	Patient-participant	50	Female	Bachelor of Arts (14 years of education)	Housewife
6	Patient-participant	59	Male	Matric (10 years of education)	Business
7	Patient-participant	48	Female	Primary (5 years of education)	Tailoring in home
8	Healthcare staff	33	Female	MS in Nutrition Sciences (18 years of education)	Nutritionist
9	Healthcare staff	36	Male	MS in Public Health (18 years of education)	Public Health Specialist
10	Healthcare staff	49	Female	MS in Physical Therapy (18 years of education)	Physical Therapist
11	Healthcare staff	43	Male	MBBS, Fellow of College of Physicians and Surgeons (FCPS)	Psychiatrist
12	Healthcare staff	30	Female	MS in Clinical Psychology (18 years of education)	Psychologist
14	Healthcare staff	35	Male	MS in Nursing (18 years of education)	Nurse

15	Healthcare staff	26	Female	Doctor of Physical Therapy (17 years of education)	Physical Therapist
16	Healthcare staff	40	Male	MBBS, Fellow of College of Physicians and Surgeons (FCPS)	Diabetologist
13	Healthcare staff	29	Female	BS in Nutrition Sciences (16 years of education)	Nutritionist
17	Carer	51	Female	Matric (10 years of education)	Housewife
18	Carer	24	Male	BS Computer Science student	Student
19	Representative of public	45	Male	Matric (10 years of education)	Property dealer/ political leader
20	Social worker	26	Male	Bachelor of Arts (14 years of education)	Computer Operator
21	Social worker	22	Female	BS Sociology student	Student

Table 2

Demographic information of workshop 2 participants (n=16)

S.No.	Role	Age (years)	Gender	Education	Occupation/ speciality
1	Patient-participant	43	Female	Master in Islamic Studies (16 years of education)	School Teacher
2	Patient-participant	48	Female	MPhil in English Literature (18 years of education)	Assistant Professor
3	Patient-participant	50	Female	Bachelor of Arts (14 years of education)	Housewife
4	Patient-participant	48	Female	Primary (5 years of education)	Tailoring in home
5	Patient-participant	45	Male	Bachelor of Arts (14 years of education)	Govt. employee (Clerk)
6	Patient-participant	41	Female	Master in Home Economics (16 years of education)	Lecturer
7	Healthcare staff	33	Female	MS in Nutrition Sciences (18 years of education)	Nutritionist
8	Healthcare staff	49	Female	MS in Physical Therapy (18 years of education)	Physical Therapist
9	Healthcare staff	30	Female	MS in Clinical Psychology (18 years of education)	Psychologist
10	Healthcare staff	35	Male	MS in Nursing (18 years of education)	Nurse
11	Healthcare staff	40	Male	MBBS, Fellow of College of Physicians and Surgeons (FCPS)	Diabetologist
12	Healthcare staff	42	Male	MBBS (17 years of education)	Medical Officer
13	Healthcare staff	35	Female	BS Occupational therapy (16 years of education)	Occupational Therapist
14	Carer	51	Female	Matric (10 years of education)	Housewife
15	Carer	58	Male	Master in Urdu (16 years of education)	Retired Govt. employee
16	Social worker	22	Female	BS Sociology student	Student

Table 3

Constraints and enablers within the domains of the Bernal cultural adaptation framework to deliver integrated Behavioural Activation and physical activity (BAcPAc) intervention to women with depression and type 2 diabetes mellitus in Pakistan

Domain	Constraints	Enablers/possible solutions
Language	• Only a limited population can understand the English language • Difficulty in understanding the terms and jargon in the English language (even educated people face difficulties in understanding English terms)	• Translate the intervention contents into Urdu language (understanding written Urdu language is much easier compared to other written local languages) • Feasibility of using layman's language
Persons (patient and therapist)	• Preference of women patients and their carers towards female therapists • A more negative attitude towards other healthcare staff compared to the treating physician	• Involve family members in the interactions between patient and therapist • Participants to receive initial verbal and/or written description and referral from the treating physician
Metaphors	• The original intervention did not include symbols or visuals in the self-help workbook	• Possibility to provide symbols for guidance of patients and their carers
Content (narrative, characters, illustrations)	• Content is primarily focused on depression among people (both men and women) living in the UK • The case studies, activities, images, and illustrations are not appropriate for women in Pakistan • Difficulties in studying and understanding lengthy written scripts, instructions, and	• Revise content to focus on women with depression and T2DM living in Pakistan • Develop case studies specific to our settings • Cultural and religious-specific activities should be added • Add images and illustrations instead of written text where

	explanations • Visual scale from 0 to 6 was used to evaluate difficulties in performing activities which may be a scale range that participants struggle to understand	possible • Add a visual scale from 0 to 10 to evaluate difficulties in performing activities. It will be easier for patients to provide a rating on a 0 to 10 visual scale.
Concepts	• Patients and their carers often have limited awareness about the effects of physical activity on mental health	• Patients and their carers are aware of the positive effects of physical activity on physical health (weight loss, body appearance, general health)
Goals	• The goal of the BAcPAc intervention was to promote physical activity and reduce depressive symptoms because the target population was people with depression	• We aim to use the intervention to promote physical activity and manage both depressive symptoms and blood glucose levels because the target population will be people with depression and T2DM
Methods	• Mental health workers are not available in diabetes care facilities • Difficulties in visiting healthcare facilities for treatment sessions • Patients may not be able to complete their worksheets without assistance	• Train non-mental health specialists on the intervention • Follow-up for intervention sessions needs to be scheduled alongside follow-up for diabetic check-ups/medication. Follow-up sessions need to be flexible to accommodate patient needs • Involvement of family members to facilitate the patient throughout the intervention period
Context	• Patients will be dependent on carers as generally women do not	• Therapist meeting with carers/family members. Carers can

	travel alone and need permission from their husbands/any other male family member to attend sessions. Moreover, women generally do not make treatment-related decisions without the involvement of family members	support therapists in the successful delivery of the intervention

Table 4

Mapping changes made to integrated Behavioural Activation and physical activity (BAcPAc) intervention as per Adaptation Matrix from Stirman Adaptation Classification

Description of the original BAcPAc intervention contents	Description of the adapted intervention content	Level of adaptation*	Type of adaptation*
Content modifications: changes made to the intervention procedures, materials, or delivery			
Curricula and components: inclusion or exclusion of elements			
The intervention was designed for adults with depression only	We added information about diabetes along with depression, where needed	2	6
Contextual examples of activities relevant to people in the UK	We changed the examples of activities to be culturally relevant. We focused on activities that are commonly performed by women in Pakistan	3	1
Change in pictures or illustrations			
The pictures included were of people from the UK	We included anonymized pictures of women presented in the local context	3	1
There were few pictures on the initial pages of the booklet illustrating only some of the activities	We incorporated some additional pictures to illustrate the activities pictorially	3	1,2,5
Visual scale from 0 to 6 to evaluate difficulties in performing activities	We replaced it with a visual scale from 0 to 10 to evaluate difficulties in performing activities	3	1
Intervention dose			

One assessment session, followed by 12 support sessions. Each session of 25 to 35 minutes	One assessment session followed by 5 support sessions. Each session of 30 to 45 minutes	3	1,4,7
Contextual modifications: modifications to the format or channel, the setting or location in which the overall intervention is delivered, or the personnel who deliver the intervention			
Inclusion and exclusion criteria			
Individuals with depression living in the UK	Women with depression and type 2 diabetes mellitus living in Pakistan	3	Not applicable
Intervention delivery			
The intervention manual is lengthy with most of the instructions in written format	Self-help materials are briefer with increased input from the therapists. Where possible, written text is replaced with images and illustrations	4,5	2,3,4,5,7
Instructions about family/friend support were mentioned only a few times	Throughout the adapted intervention, a stronger social support component is advised to ask patients to involve family members	3	2
The intervention was delivered by trained psychological well-being practitioners who completed an accredited psychological well-being practitioner training programme	The intervention will be delivered by non-mental health specialists working in diabetes care services. Initial verbal/written description and referral to the intervention will be provided by the treating physician	4	Not applicable
Modifications to the training and evaluation process			

Training (changes made to the training of personnel)			
Trained psychological well-being practitioners received an additional one-day training	Non-mental health specialists will receive 3 days of face-to-face training	4	2,5,6,7
Evaluation measures			
Physical activity and depression were the main outcomes	In addition to physical activity and depression, we will also evaluate glycaemic control. Moreover, after the treatment, we will also evaluate activities in which patients face difficulties at the start of the treatment.	2	2,5

Stirman levels and types of adaptation

Level of adaptation

1. Individual recipient level: The intervention is modified for a particular recipient (e.g., simplifying language if a patient has cognitive impairment or if language barriers exist; changes to increase cultural relevance for an individual recipient).

2. Cohort level: The intervention is modified for individuals grouped within the intervention setting into a treatment group, a class, or another type of cohort (e.g., a specific psychotherapy group, grade, or classroom).

3. Population-level: The intervention is modified for application to a particular cultural, ethnic, clinical, or social group (e.g., repetition of intervention components for all patients with cognitive impairments; development of culturally relevant vignettes to be used with all individuals of a particular ethnic identity).

4. Provider/facilitator level: Modifications are made by a clinician/facilitator for all of their participants (e.g., 'I never set an agenda when I do cognitive therapy').

5. Unit level: A modification is made by all of the facilitators in a unit (e.g., clinic/department/grade) within a larger organisation (e.g., 'We can only do 60-minute intervention sessions instead of 90-minute sessions in our clinic').

6. Hospital/Organisation level: Modifications are made by an entire organisation.

7. Network/Community level: Modifications are applied by an entire network or system of hospitals/ clinics/schools (e.g., a Veterans Affairs; school district) or community.

Types of adaptations

1. Tailoring/tweaking/refining: This code was assigned to any minor change to the intervention that leaves all of the major intervention principles and techniques intact while making the intervention more appropriate, applicable, or acceptable (e.g., modifying language, creating slightly different versions of handouts or homework assignments, cultural adaptations).

2. Adding elements (intervention modules or activities): Additional materials or activities are inserted that are consistent with the fundamentals of the intervention (e.g., adding role play exercises to a unit on assertiveness in a substance abuse prevention intervention).

3. Removing elements (removing/skipping intervention modules or components): Particular elements of the intervention are not included (e.g., leaving out a demonstration on condom use in an HIV prevention intervention for adolescents).

4. Shortening/condensing (pacing/timing): A shorter amount of time than prescribed is used to complete the intervention or intervention sessions (e.g., shorter spacing between sessions, or shortening sessions, offering fewer sessions, or going through particular modules or concepts more quickly without skipping material).

5. Lengthening/extending (pacing/timing): A longer amount of time than prescribed by the manual/ protocol is spent to complete intervention or intervention sessions (e.g., greater spacing between sessions, longer sessions, more sessions, or spending more time on one or more modules/activities or concepts).

6. Substituting elements: A module or activity is replaced with something that is different in substance (e.g., replacing a module on condoms with one on abstinence in an HIV prevention program).

7. Reordering elements: Modules/activities or concepts are completed in a different order from what is recommended in the manual/protocol. This code would not be applied if the protocol allows flexibility in the order in which specific modules or interventions occur.

8. Integrating another approach into the intervention: The intervention of interest is used as the starting point, but aspects of different therapeutic approaches or interventions are also used (e.g.,

integrating an ‘empty chair’ exercise into a ‘CBT for Depression’ treatment protocol).