

Integrating Motivational Interviewing into Clinical Care to Increase Physical Activity Levels in Women with Gestational Diabetes

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Abstract

Background: Regular physical activity (PA) improves glycaemic control in women diagnosed with Gestational Diabetes (GDM). However, PA advice competes with other components of care, with many women forgoing the benefits of regular PA. Motivational interviewing (MI) is an effective technique for increasing individual PA levels. A clinical pathway was developed integrating MI on PA into the routine care. This report evaluates the impact of MIs on self-reported PA levels.

Methods: Women attending a single centre NHS GDM clinic were invited to engage in an individual PA-focused MI session, delivered by a trained midwife. This included goal setting and activity planning. All women had a confirmed diagnosis of GDM based on a 75g oral glucose tolerance test using the International association of diabetes and pregnancy study group diagnostic thresholds. A modified version of the exercise vital sign was used to evaluate self-reported aerobic PA levels at baseline and two-week telephone follow-up. PA levels were coded into three categories: i) red (<30mins moderate intensity PA (MIPA)/week), ii) amber (30-150mins MIPA/week) and iii) green (\geq 150mins MIPA/week). Women with contraindications to PA were excluded. The main outcome was the difference PA levels from baseline to two weeks. The Pearson's Chi-squared test was used to evaluate statistical difference in self-reported PA levels from baseline to follow-up.

Results: Complete follow-up data was obtained from 62 women. Mean gestation was 27+5/40 weeks (9-36+4/40), mean age 31.7y (21-43y) and mean BMI 29.9kg/m² (18.3-48.2 kg/m²). At baseline, 19 (30.6%) were coded red (<30mins MIPA/week); 26 (41.9%) amber (30-150mins MIPA/week); and 17 (27.4%) green (\geq 150mins MIPA/week). Self-reported physical activity levels of these women at two-week follow-up revealed only 3 (4.8%) women coded red, 24 (38.7%) amber and 35 (56.5%) green. This demonstrates a significant association for increased PA levels after MI at two-week follow-up ($p=0.0001$).

Conclusion: This new clinical pathway provides encouraging results, showing that self-reported PA increased significantly at two-week follow-up. Further work is now required to examine the impact on glycaemic control, maternal and fetal outcomes, and maintenance of PA levels. This model of care should be integrated into other high-risk patient groups.

Background

Gestational diabetes mellitus (GDM) is defined as glucose intolerance first identified in pregnancy that resolves postpartum. It has an increasing prevalence worldwide(1). GDM is associated with potentially serious complications for both mother and baby(2). Fundamental to the management of GDM is controlling blood glucose levels, with increasing levels of hyperglycaemia suggested as the mechanism for the increased risk of adverse maternal and infant outcomes(3).

Management of GDM includes lifestyle interventions and pharmacological therapy. Lifestyle interventions (including as a minimum healthy eating, physical activity (PA) and self-monitoring of blood

glucose concentrations) are the only interventions that have reported health improvements for maternal and fetal outcomes(4).

There is growing evidence surrounding the benefits of PA amongst women with GDM. Meta-analyses of PA/exercise interventions have shown improvements in glycaemic control and reduced insulin requirements(5–7). Other benefits include improved cardiovascular fitness, mental well-being and prevention of hypertensive disorders(8, 9). It is recommended women undertake at least 150 minutes of aerobic PA and perform muscle strengthening activities twice per week throughout pregnancy(8, 9). Despite this, a recent report found at least 65% of women with GDM are not meeting recommendations(10). Common reported barriers are fatigue, lack of time and pregnancy discomfort. Frequent enablers include maternal and fetal health benefits, social support and pregnancy-specific programs(11). It has been highlighted that women with GDM require clear, simple and specific messages to feel confident and safe about being physically active(12). However, time allocation and resources compete with other components of care, and many inactive women forgo the benefits of PA.

Integral to PA interventions are Behaviour Change Techniques (BCT), particularly those that are person-centred addressing specific barriers and enablers(11). They have been shown to reduce the decline of PA during pregnancy(13). Motivational Interviewing uses a number BCTs that has been shown to improve PA levels in those with chronic disease(14), however no studies have examined a PA specific motivational interviewing intervention in women with GDM. MI is designed to strengthen personal motivation and commitment to individualised goals by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion(15). Women with GDM are a potentially motivated group seeking to optimise their health and glycaemic control over a short period of time who may respond well to specific PA motivational interviewing. In this quality improvement project, motivational interviewing was incorporated into routine clinical care for women with GDM. We evaluate the impact of this approach on self-reported PA levels two weeks after motivational interviewing.

Methods

This was a service evaluation of a quality improvement project to introduce motivational interviewing into routine care with the aim of increasing PA in women with a diagnosis of GDM.

Women attending a weekly GDM clinic at the Women's Centre, Oxford University Hospitals NHS Foundation Trust between May 2018 and August 2019, with a confirmed diagnosis of GDM as defined by IADPSG recommendations(16) and had no contraindications to PA (as per the internationally recognised Canadian guidelines(8)) were invited to be enrolled.

Women were invited to engage in a 20-minute individual motivational interview on PA, in addition to their routine care appointments. Verbal consent was obtained to participate in the interview. The motivational interview took place at their initial hospital appointment following a diagnosis of GDM. This was delivered by a trained healthcare professional (HCP) (midwife or doctor). The intervention was delivered using a framework, where motivational interviewing micro skills (open-ended questions, affirmations,

reflections and summaries) were used in all sessions to progress participants through the processes of change (engagement, focusing, evocation, and planning)(15). The session included person-centred goal setting and activity planning. Specific information about the benefits and types of suggested PA. A telephone consultation was undertaken two weeks after the initial motivational interview to help build self-efficacy, assess progress against their own goals and review PA levels.

Self-reported PA levels were used as the outcome measure. A modified version of the Exercise Vital Sign (EVS) (17) was used to evaluate baseline self-reported PA of moderate intensity or greater. The EVS consists of two questions.

- 1) On average, how many days per week do you engage in moderate intensity or greater PA (like a brisk walk) lasting at least 10 minutes?
- 2) On those days, how many minutes do you engage in activity at this level?

The introductory text of the EVS was modified to be specific to pregnancy. The EVS was recorded at the initial motivational interview appointment and at the two-week telephone appointment. Total weekly aerobic activity was calculated. This tool was chosen as it is simple and time-efficient to use, when entered in the electronic patient record system, it automatically calculates and documents the weekly PA level and their activity category.

To aid interpretation and explanation to women, activity levels were coded in a traffic light system with three categories (red, amber & green), based on minutes of moderate intensity PA completed per week (MIPA/week). Red was defined as less than 30 minutes of moderate intensity PA, amber 30–149 minutes and green 150 minutes or more. These categories were chosen with reference to the most recent PA guidelines recommending 150 minutes of moderate intensity PA/week(10–12). The specific categories were adopted from the activity classification used in the Health survey for England(18).

Data was analysed using Microsoft Excel (version 16.29). Descriptive statistical analysis was carried out: Paired T-test was used to compare self-reported PA before and after the motivational interview. Pearson's Chi-squared test was used to assess correlation and determine statistical significance between baseline and 2-week follow-up PA levels. Statistical significance was determined as $< 5\%$ ($p < 0.05$). Those without complete follow-up data were excluded from this analysis.

Incomplete data sets were excluded by the analyses this included women who declined to participate in the 2-week follow-up telephone call and those who were not contactable by telephone for the follow-up consultation.

This quality improvement project was part of a service evaluation project to improve the standards of the care within the GDM service. It was registered with the Oxford University Hospital Trust Maternity Departmental Clinical Governance Committee

Results

One hundred and fifteen motivational interviews were undertaken over the time period with baseline self-reported PA data and 2-week self-reported PA follow-up data was obtained from 64 women (56%). Of the 51 (44%) women whereby follow up data was not obtained, nine declined their consent for the follow-up telephone call, 36 did not answer the call, three accepted the call but did not want to discuss their physical activity levels at that time. Two women were admitted with complications of their pregnancy within the 2-week follow-up period (unrelated to physical activity), and one delivered her baby.

At baseline, mean age of 64 women with completed follow up data was 31.5y (21-43y), mean gestation 27 + 5/40 (9–36 + 4/40) and mean BMI 29.9 kg/m² (18.3–48.2 kg/m²).

At baseline, the mean reported weekly minutes of PA was 101.0 min/week (SD 100.1); 17 women (27%) reported at least 150 min of PA per week; 20 (31%) women reported less than 30 minutes per week and 27 (42%) undertook between 30 and 149 min of PA/week. At two-weeks post intervention the mean weekly minutes of PA was 176.3 min/week (130.49) (Table 1).

Table 1

Self-reported moderate intensity physical activity levels at baseline (prior to motivational interview) and 2 week follow-up.

	Total Cohort PA (mins/week)	Average per Individual (mins/week)	P value
Baseline	6465	101.0 (SD 100.1)	P < 0.001
2 Week Follow-Up	11280	176.3 (SD 130.49)	

Thirty-six women (56%) reported undertaking at least 150 minutes/week, 3 (5%) of women post intervention reported undertaking less than 30 minutes of moderate intensity activity per week (Table 2 & Fig. 1) and 25 (39%) reported between 30 and 149 min PA/week.

Table 2

Modified EVS output for self-reported physical activity levels at baseline and 2-week follow-up.

	Modified EVS Output			P value
	Red	Amber	Green	P < .0001
Baseline	20 (31.3%)	27 (42.2%)	17 (26.6%)	
2 Week Follow-Up	3 (4.7%)	25 (39.1%)	36 (56.3%)	

(i) Red (<30mins MIPA*/week)

(ii) Amber (30-149mins MIPA/week)

(iii) Green (<150mins MIPA/week).

* Moderate intensity physical activity

There was a significant association between the motivational interviewing intervention and increased weekly PA at two-week telephone follow-up ($P < 0.001$)

Discussion

The incorporation of PA orientated motivational interview into routine clinical care for women with GDM has demonstrated encouraging results. Self-reported PA levels increased significantly at two-week follow-up. It appears women with GDM are receptive to this approach, with a mean increase of 75 minutes/week in PA levels, with more than half of the women increasing their activity to meet the PA guidelines(8, 9).

At baseline visit only 27% of women attending our GDM service reported meeting the aerobic portion of the PA recommendations, in contrast to approximately 58% of all women aged 16 and over in England meeting this part of the guideline(18). Whilst it is acknowledged activity levels decline during pregnancy(19), post motivational interview intervention figures were comparable to those of the general population (56% vs 58%).

Comparing studies examining activity levels in pregnancy, particularly in the third trimester, is difficult due to variations in recording methods and definitions. In most studies, PA is treated as a categorical variable, reported as a summary measure for the entire pregnancy or only reported in a single trimester(20). Therefore, it is challenging to establish typical/expected PA levels. Amongst those using a validated assessment in the third trimester, Harrod et al using the Pregnancy Physical Activity Questionnaire (PPAQ) found 38% of the 823 pregnant women met the previous ACOG guidelines (30 minutes of moderate activity on most days of the week) in late pregnancy(21) whilst Watson et al using hip accelerometry found a median MVPA in 16.6 min/day amongst 85 women in the third trimester(22).

Relatively few studies have assessed PA levels specifically in women with GDM. An early report in 2006, found in a postal survey of 28 women with GDM that only 39% of women were meeting exercise recommendations(23). A more recently published report found comparable findings in 2706 women with GDM (measured with the International Physical Activity Questionnaire, IPAQ). It reported that 26% were classified as inactive (0–10 min PA/week), 39.7% insufficiently active (11–149 min PA/week) and 34.3% active (more than 150 min PA/week) during pregnancy(10). This is similar to our cohort, of whom 27% reported more than 150 min/week of moderate intensity physical activity, and 31% reported less than 30 min/week. Nevertheless, no studies using objective measures have been reported.

Whilst the limited evidence suggests that PA levels are low amongst women with GDM(10, 23), in contrast, there is growing high quality evidence surrounding the benefits of PA. Specifically; meta-analyses have shown that PA interventions can improve glycaemic control(6, 7). A recent systematic review of twelve trials including both aerobic and resistance exercise found that requirements of insulin therapy, dosage, and latency to administration were improved in the exercise groups(6). This is supported by high quality evidence that PA is a beneficial adjunctive therapy in the management of type 2 diabetes mellitus through its ability to increase glucose uptake and improve insulin sensitivity(24).

There is currently insufficient high-quality evidence to determine the effect of exercise on longer term maternal and infant outcomes(25). Programs of either aerobic or resistance exercise appear to be effective at improving postprandial glycaemic control and lowered fasting blood glucose. The characteristics exercise programs are those that are performed at a moderate intensity and for a minimum of three times a week(5). Greater supervision, either face-to-face or via phone follow-up, appeared to be associated with higher levels of adherence to exercise interventions(5). The challenge remains to translate these established research findings into practical everyday use in health care system where PA interventions in secondary care are notably underutilized.

This evaluation highlights the promising opportunity for motivational interviewing to be used to increase PA levels in this setting. The diagnosis of GDM can have a profound effect on women and appears to be a moment of change that encourages them to reprioritise their health and lifestyle(12). Positive use of this emotive response is important due to the short window of opportunity for maximising blood glucose control and minimising risk to the fetus.

Whilst motivational interviewing has been shown to increase physical activity in individuals with long-term health conditions(14), there is an absence of specific evidence regarding PA motivational interviewing interventions in women with GDM. There are successful examples of motivational interviewing being used in other lifestyle interventions amongst pregnant women. A small pilot study demonstrated significant reduction in alcohol consumption at 2-month follow-up after a 1-hour motivational interview(26). It has been shown to be effective in improving healthy eating behaviours in pregnant women with T2DM(27). The multi-centre randomised controlled DALI trial(28) used motivational interviewing principles in women at risk for GDM to address healthy eating and physical activity behaviour changes, reporting increased task self-efficacy for PA.

The intervention in this evaluation encompasses some of the key elements highlighted in the literature and may explain its effectiveness to increase PA levels through addressing key barriers and enablers. Harrison et al highlights that women with GDM require clear, simple, specific PA messages directly related to pregnancy outcomes that are delivered by a credible source with flexible options tailored to fit in with lifestyles(12). The importance of the clinician's role to increase self confidence in women's ability to be physically active, as well as provide guidance to overcome barriers to PA, is emphasised(29). A systematic review of 14 studies of behaviour change interventions in pregnancy found that a range of BCTs can be implemented to reduce the decline of PA during pregnancy. Face-to-face interventions, with goal setting and feedback are more likely to be associated with positive change(13) and combined face-to-face and telephone interventions have been shown to be effective(30).

This service evaluation is a successful example of how a motivational interviewing PA intervention can be incorporated into routine care and women with GDM appear willing to engage. Whilst the findings are positive, they must be interpreted with caution. The sample size was small, non-randomised and lacked a control group. Participation was not mandatory, which may have resulted in a selection bias toward those more likely to respond to motivational interviewing. There was a high loss to follow up rate, with many

women not answering the follow up telephone call. This is likely to be explained by many women not willing answer a call from an unknown number (caller identification is withheld from the hospital phoneline).

A validated self-reported outcome measure was used, however this relied on patient recall and has not been specifically validated for pregnant women. No objective measurement of PA was taken. Self-reported measures for PA are shown to over-estimate activity when compared to objective measurement. This may have affected the follow-up result in our study. The fidelity of the motivational interviewing session was not tested and the duration of the follow up was limited to two weeks.

Further work is now required to evaluate this intervention in a randomised controlled trial with objective measurement of PA. Longer term follow-up data including postpartum data would be valuable to understand whether this intervention can influence longer term outcomes, such as the development of type 2 diabetes. Understanding other clinical outcomes such as blood glucose control, insulin use, maternal and fetal outcomes is required. Finally, cost effectiveness of this intervention needs to be evaluated to help consider the scalability of this intervention and measure to reduce the number of women lost to follow up.

Conclusion

This quality improvement project provides promising evidence that this approach of integrating PA focused motivational interviewing into routine care for women with GDM is feasible, acceptable and at least in the short term can increase self-reported PA levels.

List Of Abbreviations

BCT – Behaviour change techniques

GDM - Gestational Diabetes

MI – (abstract) Motivational interviewing

PA- Physical Activity

T2DM – Type 2 Diabetes Mellitus

Declarations

Ethical Approval and consent to participate:

This quality improvement project was part of a service evaluation project to improve the standards of the care within the GDM service. It was registered with the Oxford University Hospital Trust Maternity Departmental Clinical Governance Committee. As this was a service evaluation formal ethic approval was

not required using the UK Policy Framework for Health and Social Care Research. (<http://www.hra-decisiontools.org.uk/research/>)

Consent for Publication

Verbal consent was obtained from participants.

Availability of data and materials:

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

LM, RS and YK are supported by NIHR Oxford Biomedical Research Centre.

LM is a part-time employee of Sensyne Health plc. The remaining authors have no disclosures of interest and there are no other conflicts to declare.

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Author contributions

HR, RS, NJ and LM contributed and helped with study design. NW, YK, KB and HC recruited and conducted interviews of the participants. RS, AR, AL contributed on interpretation and analysis of data. RS, LM and AR drafted and wrote the manuscript. All authors revised the content of the article, and approved the final version.

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Figures

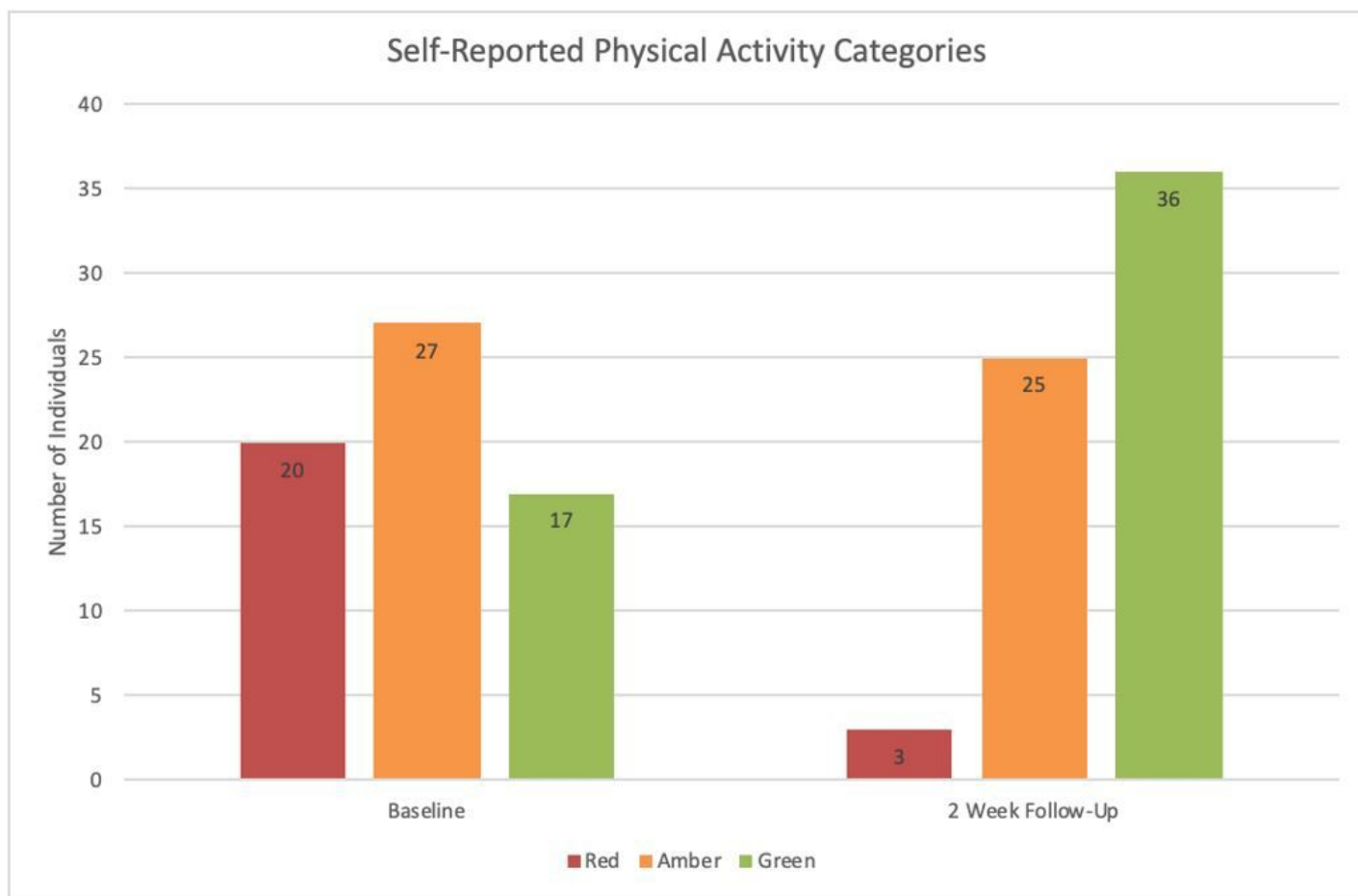


Figure 1

Self-reported physical activity categories at baseline and 2-week follow-up. (i) Red (<30mins MIPA*/week) (ii) Amber (30-149mins MIPA/week) (iii) Green (<150mins MIPA/week). * Moderate intensity physical activity