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EFFECTIVENESS OF A COMMUNITY INTERVENTION, LEAD BY NURSES, IN PEOPLE WITH RISK OF TYPE 2 DIABETES: SYSTEMATIC REVIEW

EFETIVIDADE DE UMA INTERVENÇÃO COMUNITÁRIA, LIDERADA POR ENFERMEIROS, EM PESSOAS COM RISCO DE DIABETES TIPO 2: REVISÃO SISTEMÁTICA

EFICACIA DE UNA INTERVENCIÓN COMUNITARIA, DIRIGIDA POR ENFERMERAS, EN PERSONAS CON RIESGO DE DIABETES TIPO 2: REVISIÓN SISTEMÁTICA

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ABSTRACT

Introduction: Diabetes is a challenge for all health systems because of its size, in 2021 there were 537 million people in the world with this disease, representing 10,5% of the population. Diabetes can only be tackled with a health in all policies approach, promoting healthy lifestyles to prevent the disease.

Objectives: To determine whether a community intervention, led by nurses, is effective in preventing type 2 diabetes, to identify the lifestyle intervention methodologies that are most effective in preventing type 2 diabetes.

Methods: In this systematic review, a search was carried out in databases (PUBMED and EBSCO) and using as search terms: "community health nursing", "diabetes *mellitus* type 2", "lifestyle risk reduction" and "health education". 32 studies were obtained, after selection and analysis, 3 studies were included.

Results: All studies included in this review aimed to assess the impact of interventions on lifestyles, in people at risk of developing Type 2 Diabetes, in a community context, with nurses as members of the coordination and education team of the participants. A positive evolution of the main parameters evaluated is transversal, as well as the fact that no participant has developed type 2 diabetes.

Conclusion: The implementation, in a community context, of interventions to promote healthy lifestyles, led by nurses, in people at risk for type 2 diabetes, has a positive effect in reducing its incidence.

Keywords: Community Health Nursing; Diabetes *Mellitus*, Type 2; Health Education; Lifestyle Risk Reduction.

RESUMO

Introdução: A diabetes é um desafio para todos os sistemas de saúde pela sua dimensão, em 2021 existiam no mundo 537 milhões de pessoas com esta doença, representando 10,5% da população. A diabetes só pode ser combatida com uma abordagem de saúde em todas as políticas, promovendo estilos de vida saudáveis, de forma a prevenir a doença.

Objetivos: Determinar se uma intervenção comunitária, liderada por enfermeiros, é efetiva na prevenção da diabetes tipo 2; identificar as metodologias de intervenção nos estilos de vida que demonstram maior eficácia na prevenção da diabetes tipo 2.

Métodos: Nesta revisão sistemática, realizou-se pesquisa em bases de dados (PUBMED e EBSCO) e utilizando como termos de pesquisa: "community health nursing", "diabetes *melli-*

tus type 2", "lifestyle risk reduction" e "health education". Obtiveram-se 32 estudos, após seleção e análise, incluíram-se 3 estudos.

Resultados: Todos os estudos incluídos nesta revisão tinham como objetivo avaliar o impacto de intervenções sobre os estilos de vida, nas pessoas com risco de desenvolver Diabetes Tipo 2, em contexto comunitário, com enfermeiros como elementos da equipa de coordenação e educação dos participantes. É transversal uma evolução positiva dos principais parâmetros avaliados, bem como o facto de nenhum participante ter desenvolvido diabetes tipo 2.

Conclusão: A implementação, em contexto comunitário, de intervenções de promoção de estilos de vida saudáveis, liderada por enfermeiros, em pessoas com risco de diabetes tipo 2, tem um efeito positivo na redução da sua incidência.

Palavras-chave: Comportamento de Redução do Risco; Diabetes *Mellitus* Tipo 2; Educação em Saúde; Enfermagem em Saúde Comunitária.

RESUMEN

Introducción: La diabetes es un desafío para todos los sistemas sanitarios por su dimensión, en 2021 había 537 millones de personas en el mundo con esta enfermedad, lo que representa el 10,5% de la población. La diabetes solo puede abordarse con un enfoque de salud en todas las políticas, promoviendo estilos de vida saludables para prevenir la enfermedad.

Objetivos: Determinar si una intervención comunitaria, liderada por enfermeras, es efectiva en la prevención de la diabetes tipo 2; identificar las metodologías de intervención en estilos de vida que demuestran mayor efectividad en la prevención de la diabetes tipo 2.

Métodos: En esta revisión sistemática se realizó una búsqueda en bases de datos (PUBMED y EBSCO) y utilizando como términos de búsqueda: "enfermería en salud comunitaria", "diabetes *mellitus* tipo 2", "conducta de reducción del riesgo" y "educación en salud". Se obtuvieron 32 estudios, luego de la selección y análisis, se incluyeron 3 estudios.

Resultados: Todos los estudios incluidos en esta revisión tuvieron como objetivo evaluar el impacto de las intervenciones en los estilos de vida, en personas en riesgo de desarrollar diabetes tipo 2, en un contexto comunitario, con enfermeras como miembros del equipo de coordinación y educación de los participantes. Es transversal una evolución positiva de los principales parámetros evaluados, así como el hecho de que ningún participante ha desarrollado diabetes tipo 2.

Conclusión: La implementación, en un contexto comunitario, de intervenciones para promover estilos de vida saludables, lideradas por enfermeras, en personas en riesgo de diabetes tipo 2, tiene un efecto positivo en la reducción de su incidencia.

Descriptores: Conducta de Reducción del Riesgo; Diabetes *Mellitus* Tipo 2; Educación en Salud; Enfermería en Salud Comunitaria.

INTRODUCTION

Diabetes is a challenge to health systems due to its pandemic dimension. In 2021 there were 537 million people in the world, between 20 and 79 years old, with this disease, representing 10.5% of the world population, in this age group, a number that is expected to increase and reach 783 million in the year 2045. This exponential increase in cases of diabetes can only be fought with a health approach in all policies, promoting healthy lifestyles in order to prevent the disease. If this increase is not stopped, it is expected that many countries will have health system sustainability problems in 2030. In Europe, the number of people, between 20 and 79 years old, with diabetes in 2021 was 61.4 million[1].

Diabetes Mellitus is a disease that is characterized by an increase in blood glucose in the long term, and it is a chronic disease, as a result of a total or partial deficiency in the production of the hormone insulin by the body or an inefficient use of the hormone. that is produced. Insulin is an essential hormone, produced in the pancreas, which allows glucose present in the bloodstream to enter cells and be converted into energy. The lack of insulin or the inability of the cells to use it leads to high levels of glucose in the blood, hyperglycemia, which is the clinical indicator for the diagnosis of diabetes. The blood glucose levels that are the reference for the diagnosis of Diabetes Mellitus are the presence of one or more of the following criteria: fasting blood glucose above 126 mg/dl; glycemia two hours after ingestion of 75 g of oral glucose above 200 mg/dl; glycemia above 200 mg/dl; glycosylated hemoglobin above 6.5%[1].

We will discuss the prevention of one of the types of Diabetes, Type 2 Diabetes, which is the most common type of the disease, accounting for 90% of all known cases. Type 2 Diabetes is initially characterized by the inefficient use of insulin by the body's cells, a condition called insulin resistance. During this period of insulin resistance, the need for increased amounts of the hormone causes a high demand for production in the pancreas which later leads to inadequate production of insulin due to failure of this organ. The emergence of this type of Diabetes is associated with inappropriate lifestyles, namely obesity and a sedentary lifestyle, so its management involves promoting an adequate weight through healthy eating, regular physical activity and smoking cessation[1].

In Portugal, in 2020, 833,315 people were registered with the National Health Service (SNS) with a diagnosis of diabetes, which corresponds to 8.1% of registered users. The Alentejo region assumes the highest value with 48,612 people with diabetes, corresponding to 9.6% of registered users. The rate of new cases registered in the same year was 5.1‰, that is, 52,126 new cases, with the Alentejo region having the second highest value, with a rate of 5.5‰[2].

In recent years, risk assessment for Type 2 Diabetes has been promoted by the National Diabetes Program *(Programa Nacional para a Diabetes* – PND), through the application of the Finnish Diabetes Risk Score (FINDRISC) scale, at national level, in primary health care. This national effort allowed 2.48 million people to be evaluated in 2020, 42% of the registered users eligible for this evaluation[2].

The FINDRISC scale, developed by the Finnish National Diabetes Program, is based on the application of a questionnaire with eight questions, about variables related to the development of Diabetes and establishes a probability of developing Diabetes in the next ten years. This scale stratifies the risk of type 2 diabetes into five grades, using a score: Low Risk (<7 points); Slight Risk (7-11 points); Moderate Risk (12-14 points); High Risk (15-20 points) and Very High Risk (>20 points). The authors of this scale recommend carrying out laboratory tests for the diagnosis of diabetes in people with a score greater than 15, that is, with High and Very High Risk. This assessment allows a stratification of the risk level of the population and simultaneously the early diagnosis[3].

In terms of stratification, in 2018, it was found that people at moderate, high and very high risk constituted 55.54% of all people evaluated, and many of these people could develop the disease in the next ten years if measures are not taken[4].

In this context, the PND considered that the need to promote the prevention of Type 2 Diabetes at national level would have to be a priority and that, to achieve this objective, it would be necessary to have a centralized national management in the General Health Directorate *(Direção Geral de Saúde* – DGS) whose implementation would be adjusted to the structures of the National Health Service *(Serviço Nacional de Saúde* – SNS), namely those that provide health services in a community context[2].

It becomes evident the need to implement interventions aimed at the adoption of healthy lifestyles, in a community context, in people at risk of developing Type 2 Diabetes, in order to prevent this disease. There are approaches whose formats are a reference in the design of this type of intervention, namely the Diabetes Prevention Program (DPP), which demonstrated a 58% reduction in the incidence of type 2 diabetes, and the Finnish Diabetes Prevention Study (DPS), which obtained results identical in terms of reducing incidence, having been designed for application in the context of primary health care, demonstrating its effectiveness in this context[5,6].

As explained above, Type 2 Diabetes is a health problem of increasing severity, and its prevention is urgent. However, there are still few data in the literature that allow us to understand the applicability, in a community context, of interventions in the lifestyles of people at increased risk of developing Type 2 Diabetes, led by nurses.

METHODOLOGY

The methodology used in this review is recommended by the Joanna Briggs Institute (JBI)[7]. In order to respond to the first stage of this methodology, the research question is presented using the format PIPOH, Population, Intervention, Professionals, Outcomes, Health Care Setting: "In the person at risk of type 2 diabetes (P), an intervention education aimed at adopting healthy lifestyles (I), led by nurses (P), is it effective in preventing this disease (O), in a community context (H)?".

The aims of this review are: to determine whether a community intervention, led by nurses, is effective in preventing type 2 diabetes; to identify intervention methodologies in lifestyles that demonstrate greater effectiveness in the prevention of type 2 diabetes.

Once the research question was formulated, and following the methodology proposed by the JBI, we defined inclusion and exclusion criteria for the researched studies: type of participants – people at risk of Type 2 Diabetes; type of intervention – studies with an educational program to change lifestyles, namely on healthy eating and regular practice of physical activity; types of results – studies that present data that allow evaluating the impact of the application of the educational program; type of studies – primary, quantitative studies, published in English from 2011 to 2021.

Research strategy

The search strategy uses March 23, 2021, as a time reference. With regard to research sources, the databases used during the research process were PubMed (National Library of Medicine) and ESBCO. The following limiting factors were used: date of publication in the last 10 years (2011-2021); with full-text available; analyzed by experts; and that the subject contained the terms "*community health nursing*", "*type 2 diabetes mellitus*", "*lifestyle risk reduction*" and "*health education*".

The keywords used were: "*community health nursing*", "*diabetes mellitus type 2*", "*lifestyle risk reduction*" and "*health education*". Using the Boolean operator "*AND*".

The search for unpublished studies was performed in: OpenGrey; DARTEurope, CAPES theses database, no results obtained.

The study selection process can be consulted on the PRISMA Flow Diagram (Figure 1↗)[8].

Assessment of methodological quality

After the selection process, 3 articles were assessed for their methodological quality, before inclusion in the review, using the JBI standardized critical assessment instrument – checklist[9,10] for quasi-experimental studies and randomized studies (Chart 1↗). The option for its inclusion remained.

Data extraction

Data were extracted using JBI[7] data extraction tools. The data extracted from each article were summarized in a table, with the presentation of the title, objective, sample characteristics, results and conclusions.

RESULTS

As mentioned, three articles were selected for this systematic review, considering the criteria previously defined. To allow an analysis of the results obtained, in each of the studies, in the main parameters evaluated, a summary of them is presented in Chart 2↗.

DISCUSSION

The studies included in this systematic literature review took place between 2012 and 2017, presenting in detail their objectives, the data collection method and their sample.

Through the analysis of the articles included in this review, it was possible to understand that evaluating the impact of interventions on lifestyles, in people at risk of developing Type 2 Diabetes, in a community context, was the transversal objective of all studies.

The analyzed studies were all carried out based on interventions carried out in a community context with nurses as members of the participants' coordination and education team.

Of the three studies analyzed, two were carried out in the United States of America (A1 and A3) and the third in Norway (A2).

As for the formats of educational interventions adopted to promote healthy lifestyles, two studies[11,13] were based on the DPP, with twelve weekly educational sessions lasting one hour, and one of the studies[11] added to these educational sessions three weekly sessions of one hour of physical exercise. In the European study[12] the intervention format was based on the DPS, where ten weekly one-hour educational sessions were held.

In all studies, the curriculum of the educational sessions was previously validated by the multidisciplinary team and the training of professionals who facilitated the educational sessions was ensured[11-13].

In the European study, in addition to the results of the educational intervention, the characteristics of the participants and non-participants were studied in order to identify future strategies to increase adherence to this type of educational programs[12].

The results presented in Table 1↗, were evaluated through weight, BMI, waist circumference, physical activity, glycosylated hemoglobin, fasting glucose and oral glucose tolerance test (OGTT)[11-13]. The results were evaluated at different times between the studies analyzed, the times chosen were at the end of the educational sessions (A1 and A3), 12 months after the start of the program (A1 and A2) and 24 months after the start of the program (A2)[11-13].

The study by Sattin *et al*[11] demonstrated a significant reduction in weight (-2.62 Kg) and fasting glucose (-1.81 mg/dl) of the participants, results that were consolidated in the evaluation of the program after 12 months, with a reduction of 2.39 Kg and 3.39 mg/dl, respectively. These results at 12 months may be associated with the format of the program, since it provided for monthly follow-up of participants by members of the team of educators, after the initial 12 weeks of educational sessions. This reinforcement of the results at 12 months reveals the need to study, in greater depth, the effect of programs prolonged in time, keeping participants in a regular follow-up system until new healthy lifestyle habits are formed. It is important to understand the best follow-up model and its most effective frequency. The most significant result was the 10.93 mg/dl reduction in fasting glucose in participants with pre-diabetes, which demonstrates that even at a more advanced stage of the metabolic changes that precede the diagnosis of diabetes, it is still possible through programs educational programs aimed at adopting healthy lifestyles to prevent the development of the disease.

The study by Følling *et al*[12] demonstrated that there may be sociodemographic differences between women who accept to participate and those who decline to participate in this type of program, namely the level of education, with a lower level of education possibly being associated with a lower level of education. lower adherence. The same was not verified in men, not being able to identify differences between participants and non-participants, however the authors mention the limited size of men who participated in this component of the study, which may have limited the results. It is important to acquire greater knowledge about the characteristics of individuals who do not accept to participate in educational interventions of this type in order to find adherence promotion strategies aimed at some population groups. In terms of the educational intervention, it was possible to observe

a significant decrease in glycosylated hemoglobin at 12 months (-0.2 mmol/mol) which was maintained in the evaluation at 24 months. The reduction in BMI was not significant, however the abdominal perimeter showed a significant reduction, especially in women, with a reduction of 2.7 cm at 12 months and 4.0 cm at 24 months. These results demonstrate the positive long-term effect of this type of intervention, with the results maintained at 24 months.

In the study by Shaibi *et al*[13] the results were more expressive in the PTGO, where a reduction of 10.8% of the glucose was observed two hours after the ingestion of 75 g of oral glucose. This study evaluated the impact of physical exercise sessions three times a week, which were part of the program, through the international physical activity survey, where there was a 26.8% decrease in weekly downtime among participants.

A positive evolution of the main parameters evaluated is transversal to all studies, as well as the fact that no participant developed type 2 diabetes[11-13].

Although all studies present similar results, the formats and implementation strategies in the community are not the same, which makes parallelism difficult. It should be noted that all educational programs proposed by the authors are based on scientific evidence.

Comparing our results with the pre-existing bibliography that addresses the topic, we found a systematic review from 2018 entitled "Global Diabetes Prevention Interventions: A Systematic Review and Network Meta-analysis of the Real-World Impact on Incidence, Weight, and Glucose" that seeks to perceive strategies to prevent type 2 diabetes. Despite the context being different from the one analyzed here and knowing a priori that this fact could influence the results, we found that the results achieved in our review are in line with those obtained in this analysis, since this suggests that interventions aimed at adopting healthy lifestyles have a positive impact on reducing the risk of type 2 diabetes[14].

CONCLUSION

Responding to the research question posed at the beginning of this review and after carrying out the analysis of the studies, we can confirm that the implementation, in a community context, of interventions to promote healthy lifestyles, led by nurses, in people at risk of diabetes type 2, has a positive effect in reducing the incidence of the disease.

It is possible to conclude that the implementation of programs with a pre-defined structure and content, based on existing scientific evidence, and the education and training of nurses, in order to play their role as implementation facilitators, are associated with the results obtained.

The reduced number of studies included in this review is highlighted. This fact represents a limitation of the systematic review; however, it allows us to attest to the need to analyze the results of the studies being implemented at the moment, whose publication is awaited. It is considered advantageous to carry out new studies that address the problem and, consequently, bring subsidies to the best structure and implementation strategies of this type of educational programs in the various community contexts.

In terms of implications for research, we suggest that any future studies be carried out with high scientific rigor, considering only controlled random samples. The concern of authors of future studies should be to reduce bias, especially through allocation concealment. It would also be fruitful to carry out studies that could identify the feasibility of this type of educational program in Portugal.

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Authors' contributions/Contributos dos autores
JD: Coordenação do estudo, desenho do estudo, recolha, armazenamento e análise de dados, revisão e discussão dos resultados.
AC: Desenho do estudo, análise de dados, revisão e discussão dos resultados.
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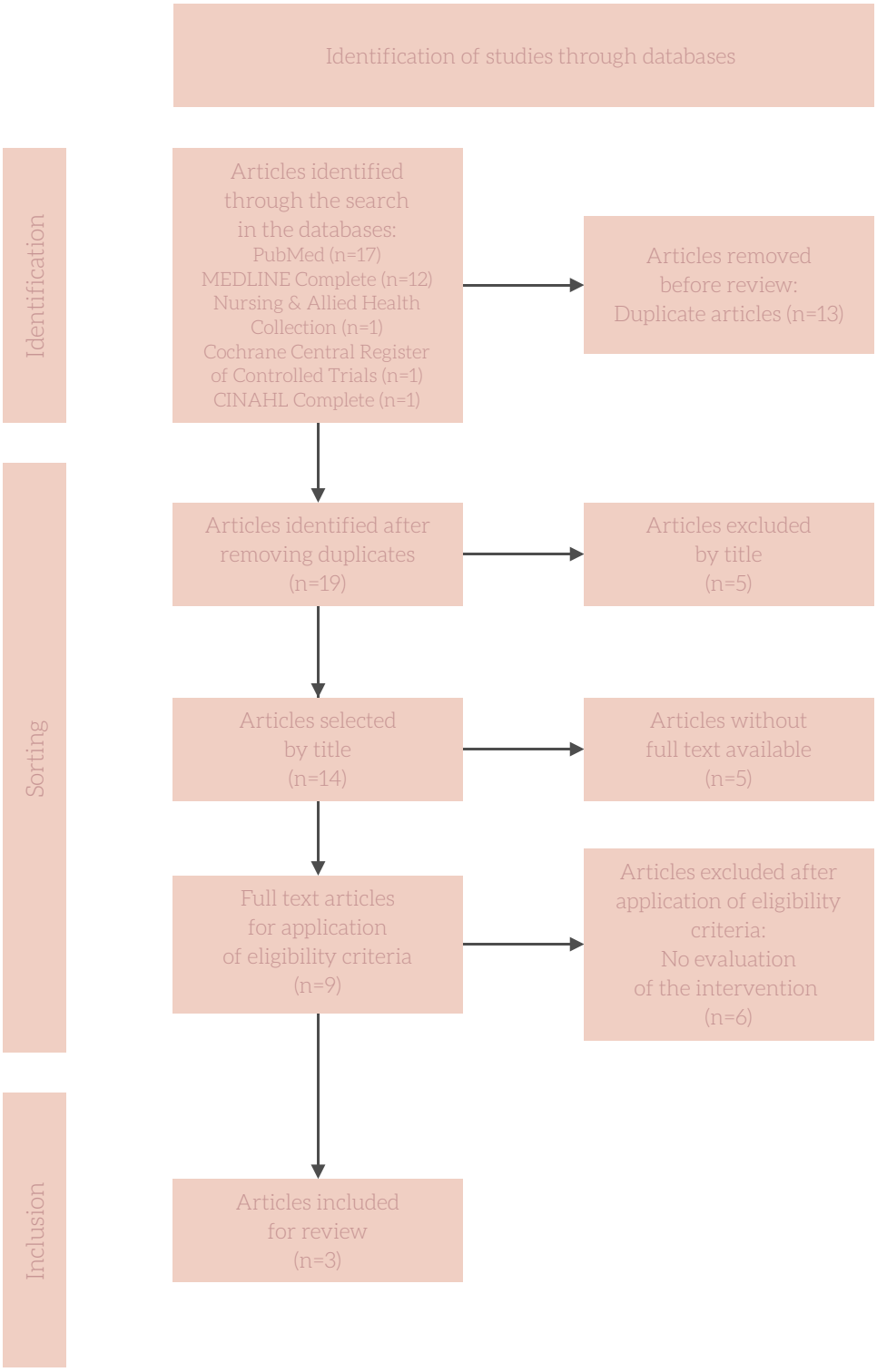

Figure 1 – PRISMA Flow Diagram of the article selection process[7].

Chart 1 – Assessment of methodological quality, Beja 2021.

Article code	Study	Level of evidence JBI	Quality/Methodological recommendation JBI
A1	Sattin *et al* (2016)	Randomized (I-C)	(12/13)
A2	Følling *et al* (2017)	Quasi-experimental (II-D)	(7/9)
A3	Shaibi *et al* (2012)	Quasi-experimental (II-D)	(6/9)

Chart 2 – Summary of the general characteristics of the studies included in the systematic review.

Study identification	Country/ Year	Aim of the study	Study design	Participants	Interventions or phenomenon of interest	Results	Conclusions
(A1) Community trial of a faith-based lifestyle intervention to prevent diabetes among african--americans	United States of America (2016)	To reduce weight by 7%, fasting glucose, and increase physical activity in overweight African American parishioners through a faith-based community adaptation of the DPP, named "Fit Body and Soul (FBAS)".	Blinded randomized controlled trial.	604 people participated, in 20 Churches, with an average age of 46.5 years, an average BMI of 35.7 kg/m^2 and an average waist circumference of 107.3 cm. 15.2% of participants had pre-diabetes.	Participants were randomly allocated into two arms, with no statistical difference between them, in the first they received the FBAS program, in the second they received the traditional health education control program. The FBAS consisted of a 12-week educational program for the adoption of healthy lifestyles, through a weekly educational session of one hour each, followed by 6 monthly sessions of one hour of behavior maintenance.	An average weight loss of 2.39 kg was observed in the FBAS participants compared to a weight gain of 0.47 kg in the control arm. There was also a significant difference in weight loss in participants who completed at least 10 educational sessions compared to those who completed less than 10 sessions (3.72 Kg and 1.52 Kg respectively). At 12 months after the start of the intervention, the 19% participants in the FBAS had a weight loss of at least 7% compared with only 8% of participants in the control arm. There was no significant difference between the arms with respect to fasting glucose.	The implementation of interventions for the adoption of healthy lifestyles in African-American individuals, in the context of religious communities, may lead to a significant reduction in weight. This study has some limitations, namely the religious context of its implementation, jeopardizing its generalization and financial incentives for churches and gifts for participants were used in order to achieve the full implementation of the program, which could be an obstacle to its application in other places and contexts.

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Chart 2 – Summary of the general characteristics of the studies included in the systematic review.↩↖

Study identification	Country/ Year	Aim of the study	Study design	Participants	Interventions or phenomenon of interest	Results	Conclusions
(A2) Individuals at high risk for type 2 diabetes invited to a lifestyle program: characteristics of participants versus non--participants (the HUNT Study) and 24-month follow-up of participants (the VEND-RISK Study)	Norway (2017)	To investigate whether the characteristics between participants and non-participants differ from each other. To evaluate the effect (24-month follow-up) of a 12-month healthy lifestyle adoption program for people at high risk of type 2 diabetes in primary care in Norway (VEND-RISK).	Non-randomized cross-sectional study.	We identified 332 individuals at high risk of type 2 diabetes to participate in VEND-RISK, of which 287 (86%) declined. The 45 participants participated in 100% of the proposed activities.	The sociodemographic characteristics of participants and non--participants were analyzed in order to identify statistical differences between them. VEND-RISK participants underwent an anthropometric assessment in order to assess whether they developed diabetes, whether glycosylated hemoglobin, whether there was a decrease in BMI, waist circumference and increased regular practice of physical activity. These assessments were made at baseline, at the end of the program and at the 24-month follow-up.	No differences were observed between men who participated and did not participate in VEND-RISK. With regard to women, a statistically significant difference was observed between participants and non-participants, the latter having fewer years of schooling. At the 24-month VEND-RISK assessment, none of the participants developed type 2 diabetes, and glycosylated hemoglobin decreased significantly in both sexes. There was a slight decrease, without statistical significance, in the average BMI of the participants, as well as in the regular practice of physical activity. There was a decrease of 4 cm in the average...	This study made it possible to compare the group of participants and non-participants, but it does not address the causes of non--adherence to the educational program. The lack of a control group for participants in the educational program, so the results are not free of bias, and it is not possible to associate them exclusively with the program. Another limitation of the study is the small number of participants, especially males. The study contributed with knowledge about the action of educational programs for the adoption of healthy lifestyles and suggests that an approach focused on motivating women...

Chart 2 – Summary of the general characteristics of the studies included in the systematic review.↩↖

Study identification	Country/ Year	Aim of the study	Study design	Participants	Interventions or phenomenon of interest	Results	Conclusions
(A2) Individuals at high risk for type 2 diabetes invited to a lifestyle program: characteristics of participants versus non--participants (the HUNT Study) and 24-month follow-up of participants (the VEND-RISK Study)	Norway (2017)	To investigate whether the characteristics between participants and non-participants differ from each other. To evaluate the effect (24-month follow-up) of a 12-month healthy lifestyle adoption program for people at high risk of type 2 diabetes in primary care in Norway (VEND-RISK).	Non-randomized cross-sectional study.	We identified 332 individuals at high risk of type 2 diabetes to participate in VEND-RISK, of which 287 (86%) declined. The 45 participants participated in 100% of the proposed activities.	The sociodemographic characteristics of participants and non--participants were analyzed in order to identify statistical differences between them. VEND-RISK participants underwent an anthropometric assessment in order to assess whether they developed diabetes, whether glycosylated hemoglobin, whether there was a decrease in BMI, waist circumference and increased regular practice of physical activity. These assessments were made at baseline, at the end of the program and at the 24-month follow-up.	...abdominal perimeter of the female participants.	...with a lower level of education will be necessary.

Chart 2 – Summary of the general characteristics of the studies included in the systematic review.

Study identification	Country/ Year	Aim of the study	Study design	Participants	Interventions or phenomenon of interest	Results	Conclusions
(A3) Effects of a culturally grounded community--based diabetes prevention program for obese latino adolescents	The United States of America (2012)	To evaluate the applicability and preliminary effects of a diabetes prevention program, in a community context, aimed at a cultural group of Latino adolescents.	Non-randomized experimental study with pre and post test.	18 adolescents of both sexes, between 14 and 16 years old, with a BMI above the 85th percentile.	Implementation of a 12-week educational program for the adoption of healthy lifestyles, through a weekly educational session and participation in three weekly 60-minute physical exercise classes, with the participation of parents and siblings of participants.	15 teenagers completed the program. A decrease in glucose at two hours (10.8%) and an increase in available insulin at two hours (23.6%) were observed in the oral glucose tolerance test. The participant with pre-diabetes (decreased glucose tolerance) had normal glucose values after the intervention.	The implementation of community interventions for the adoption of healthy lifestyles aimed at adolescents may reduce the risk of developing type 2 diabetes; The role of involving the community and the participants' families in this type of intervention needs to be studied in other contexts, as it proved to be relevant to the results.

Table 1 – Results of the application of educational programs.

Results assessment	Article	Weight (Kg)	Abdominal circumference (cm)	Body Mass Index (Kg/m^2)	Fasting glucose (mg/dl)	Glycosylated Hemoglobin (mmol/mol)	PTGO (%)	Participants diagnosed with diabetes
End of	A1	-2,62	--	--	- 1,81	--	--	0
Educational	A2	--	--	--	--	--	--	--
Intervention	A3	-0,001	-3,6	-1,5	-0,06	--	- 10,8	0
At 12 months after	A1	-2,39	--	--	-3,39	--	--	0
the beginning of	A2	M*: -0,3	M: -0,5	M: -0,1	M: 0	M: -0,2	--	0
the Educational		W**: -1,0	W: -2,7	W: -0,4	W: -0,2	W: -0,2		
Intervention	A3	--	--	--	--	--	--	--
At 24 months after	A1	--	--	--	--	--	--	--
the beginning of	A2	M: -0,9	M: -1,7	M: -0,2	M: +0,3	M: -0,2	--	0
the Educational		W: -1,4	W: -4,0	W: -0,6	W: -0,1	W: -0,2		
Intervention	A3	--	--	--	--	--	--	--

*Mens (M); **Women (W).