

Research Priorities and Indicators for Lifestyle Programs to Address Cardiometabolic Conditions

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Abstract

Background: Cardiometabolic conditions are a major and growing health burden in many countries. At least one-third of middle-aged adults with overweight and obesity develop various combinations of type 2 diabetes, hypertension, dyslipidemia, and other cardiometabolic conditions. Currently, all relevant clinical and community guidelines recommend lifestyle (e.g. diet and physical activity) interventions, yet current evidence suggests limited and variable uptake by either primary care or public health services. New implementation research in lifestyle interventions is needed in multiple jurisdictions. As part of this effort, some agreement within the research community on priorities and core measures and indicators across studies would improve comparability and drive progress. Members of a new volunteer network undertook a first Delphi process to determine initial consensus.

Methods: Network members were invited by email to participate and completed two rounds of a modified Delphi process delivered through online questionnaire and teleconferences. Results were sent back to participants at the end of each round of the survey. High priority with consensus was defined as the median and 25-75%ile range within the 7 to 9 range on a 9-point scale.

Results: Fifty-three people were invited and provided with a link to the first questionnaire. Twenty-five (47%) and 18 (34%) participants completed the round 1 and round 2 surveys, respectively. Of 22 possible research priorities, four were rated high priority with consensus, including: evaluating the efficacy and effectiveness of interventions in place, improving existing interventions for sustainability, and clinical and public health research to advance existing knowledge to develop new capacities. Of the 93 measures and indicators proposed, 15 achieved consensus with an additional nine measures having high medians, but greater variance.

Conclusions: This first effort suggests a wide range of research priorities within the group, but also broad agreement on a few core implementation research priorities. There is currently limited agreement on core indicators/measures for implementation studies and additional work is needed. The results provide a starting point for further development of common measures for implementation research in lifestyle interventions for cardiometabolic conditions.

Contribution To The Literature

- Researchers agree that new public health and clinical implementation studies are needed to address the high prevalence of cardiometabolic conditions.
- Delphi study in a newly formed research network for lifestyle approaches identified highest research priorities and possible core measures for such studies.
- The need for inter-disciplinary and inter-sectoral approaches was highlighted by participants.

Background

Cardiometabolic conditions and diseases are a major and growing health burden in many countries, as obesity continues to increase worldwide (1). Excess body weight is associated with heterogeneous metabolic effects and health risk implications have been variously described by different research groups (2). Cardiovascular disease (CVD) remains a prominent clinical disease risk. Adverse metabolic effects of excess body weight become more prominent in middle age, with about 40% of adults older than 60 years having metabolic syndrome (3), characterized by three or more indicators including higher waist circumference, higher blood pressure, dyslipidemia characterized by low high-density lipoprotein and elevated triglyceride levels, and elevated glucose levels (4). According to the Framingham Risk Score, one of the current established clinical tools for estimating 10-year CVD risk (5), 29% of Canadians 20–79 were at intermediate or high risk (6).

Significant progress has been made in understanding the pathophysiological basis of these conditions and numerous clinical trials of behaviour change and medications have been conducted. Although the importance of diet and exercise in moderating these conditions was recognized from the early CVD trials, such as the Multiple Risk Factor Intervention Trial (MRFIT) in the mid-1970s (7), current health care practice tends to focus on the provision of medications over formal behavioural interventions (8). While MRFIT focused on the treatment of high cholesterol levels, hypertension, and smoking (7), obesity and diabetes have emerged in the years since, as important conditions that also need to be addressed (5).

Currently, all relevant practice guidelines suggest combining lifestyle interventions with medical treatment to prevent and treat cardiometabolic conditions (5, 9–11). However, discrepancies exist between recommended interventions and actual health care practice, with limited and variable uptake by either primary care or public health (8). Why is uptake poor? Among the many barriers, high prevalence of cardiometabolic conditions, competing priorities, limited evidence for effectiveness in different contexts (rural and remote; population subgroups), lack of common metrics across studies, and lack of capacity and resources have been cited (12).

The need for implementation research in the areas of health behaviour and lifestyle has been recognized (13, 14). Many of the resources for lifestyle change in communities, such as recreation centres and parks, already exist but have not necessarily been focused on addressing cardiometabolic conditions. Determining the most effective and efficient strategies to address cardiometabolic conditions and diseases is not straight forward. To encourage more implementation research, individual researchers and teams need to come together, develop proposals, obtain funding and test various approaches. A wide range of academic and professional expertise is needed in areas such as nutrition, kinesiology, psychology, behaviour change, social work, family medicine, public health medicine, nursing, epidemiology, political science, policy analysis, digital communications, project management, and health economics to find the best mix of services for different health system contexts.

Such implementation studies need to address key questions, using measures and outcomes that will be valid and comparable over time. To achieve this goal, the objective of this preliminary consensus study was to identify initial areas and degree of consensus on potential research priorities and core measures

for lifestyle implementation studies, building on previous research and literature reviews which collectively have indicated little consistency (e.g., Li, A. PROSPERO CRD42018075697). We employed Delphi techniques to achieve this objective. Originally developed by the Research and Development (RAND) corporation (15), the method has evolved over time, with numerous variations (16). Online survey methods and digital technology for discussions offer new opportunities to engage diverse participants. The literature on previous research prioritization (17, 18) and indicator efforts was reviewed, as multiple groups have been undertaking such efforts, using a range of approaches, from consensus by an invited group of experts to formal Delphi processes to identify both areas of agreement and divergent views.

Methods

Study Design

A two-round modified virtual Delphi process was planned and conducted in Feb-April 2020. We followed the Recommendations for the Conducting and Reporting of Delphi Studies (CREDES). See Additional file 1: Appendix A.

Participant recruitment

As a first step, funding was obtained to initiate a new network of researchers to promote the development of new research proposals and identify parameters for potential implementation proposals (see Figure 1). Potentially interested researchers and implementation experts from Canada, the United States, United Kingdom and Australia were identified from personal contacts and from discussion at two conferences in 2019: Diabetes Canada and North American Primary Care Research Group. In addition, all researchers active in Canada who had published on primary care and/or lifestyle interventions in diabetes, pre-diabetes and metabolic syndrome over the past 10 years were identified through PubMed and CINAHL and contacted by email for possible interest in the network. Two teleconferences and a webinar on knowledge translation had been completed prior to initiating the Delphi process. Invitation emails were sent to 53 network members with a link to the survey and an attached document describing the purpose and process, as well as shared access (through Dropbox) to six key background papers (18-23). They were also encouraged to send an invitation to interested others.

Questionnaire Development

Evaluation Criteria and Research Priorities

A preliminary list of research priorities was generated through feedback from network members from the first two teleconferences (n=53). The list was highly diverse and included a mixture of specific and general topics, reflecting the many ways research can be described. The literature was therefore searched for possibly relevant implementation research frameworks. The work of the Child Health and Nutrition Research Initiative (CHNRI) was notable as they had used systematic and transparent methods to set child-focused health systems research priorities in low-income and middle-income countries (24).

Multiple health research prioritization exercises had been undertaken over several years using CHNRI methods and two innovations were adapted to the present project. The first was an explicit list of priority-setting criteria that might apply to judgments of different stakeholders in a research priority-setting context. These 20 evaluation criteria were rated for relevance to our topic area (23). The second innovation was the use of the 4D framework for describing research focus (“description”, “delivery”, “development” and “discovery” research), which we adapted to describe 22 specific research areas for assessment (23). See Additional File 1: Appendix B for 20 options related to *Evaluation Criteria* and 22 research areas included under *Research Priorities*.

Indicators and Measures

Measures from two different consensus processes addressing obesity management were categorized, combined and adapted by one researcher (PB) to create an initial list. Some measures were identified by both groups, but many were not. The Accumulating Data to Optimally Predict Obesity Treatment (ADOPT) is a US-based effort to better understand and deliver tailored obesity treatments, based on behavioural, biological, environmental, and psycho-social domains. Part of this work involved the development of a Core List of Constructs and Measures, an initial list of high-priority constructs based on the current state of science (21). The OBESity Diverse Interventions Sharing group (OBEDIS) developed a set of European guidelines for a minimal set of variables to include in future clinical trials on obesity, regardless of the specific endpoints (19). In addition, other possible measures were identified from previous implementation study guides (20, 22). The final seven categories were:

- Demographic/Environment/Context (15 indicators/measures)
- Diet and Physical Activity (8 indicators/measures)
- Formative and Process Measures (6 indicators/measures)
- Psycho-social Constructs (21 indicators/measures)
- Body Composition and Energy Estimation (6 indicators/measures)
- Biological/Clinical/History measures (33 indicators/measures)
- Social Environment (4 indicators/measures)

The finalized online Delphi survey was divided into three sections – *Evaluation Criteria, Research Priorities, and Measures/Constructs/Outcomes*. Each statement was rated on a 9-point scale, which ranged from *not relevant/ not priority/not core* (1-3), to *uncertain/ equivocal* (4-6), to *highly relevant/priority/core* (7-9). The survey avoided making any forced responses and provided forward-backward buttons. Additional suggestions and comments were requested at the end of each section. The survey was reviewed and pilot-tested by the research group. The round 1 and round 2 surveys were very similar, with 132 and 135 statements, respectively. In particular based on feedback from round 1, in round 2, two indicators were added to the *Demographic/Environment/Context* (i.e. marital status and material hardship (e.g. difficulty paying bills, rent etc.) and one indicator was added to *Diet and Physical Activity*

(i.e. type / extent of food processing as indicator of diet quality). See the Additional File 1: Appendix B for the Final Delphi Questionnaire.

Data collection

Each round of the Delphi process was delivered as a self-administered survey (developed and delivered through Qualtrics®) and debriefing virtual meetings (delivered through ZOOM). Six relevant background papers were made available to all participants by Dropbox Sharing feature (18-23). For round 1, participants had about 2 weeks to complete the survey (Feb 25 - Mar 12, 2020). Before round 2, they received an Excel summary listing each statement, the group results (median and 25-75%ile), and their own answers. Two virtual meetings were conducted to allow for differences in participant schedules. Both meetings had the same format of reviewing the overall results and most contentious statements, as well as a general discussion of the process. Meeting notes were reviewed by the research team and sent to participants after each meeting. For round 2, the survey was deployed with a 2-week turn-around (Mar 28 - Apr 12, 2020) and results were again sent back to participants. A final online conference meeting was held in April 2020 to review results and discuss next steps for the development of the network.

Analysis

Initial review of group results after round 1 indicated that all but one statement (*Evaluation Criteria: Likelihood of generating patents/lucrative products*) was at least partially supported, so scores were highly left skewed. Despite encouragement to use the full scoring range, scores were still highly skewed after round 2. To report results, we therefore used the most strict definition of strong agreement, as described by the original developers (15), which required that all three indicators (median, 25th and 75th percentile) fell within the 1-3 or 7-9 range. A second set of statements had the median and 75%ile fall within 7-9 range, but the 25%ile indicated more variable scoring. These statements achieved weaker agreement. The third group of uncertain statements had lower medians and diverse ranges.

Results

Participation

A total of 53 researchers from Canada (n=47), US (n=3), UK (n=1) and Australia (n=2) expressed interest in the network and 50 of them were interested in participating in the Delphi process. Only one member of the research team (PB) did not complete the Delphi questionnaire. Of the 53 people contacted by email about the Delphi process, 47% of them (n=25, including 1 from USA, 2 from British Columbia, 3 from Alberta, 1 from Saskatchewan, 3 from Manitoba, 5 from Ontario, 8 from Quebec, 2 from Newfoundland) completed the round 1 Delphi survey and attended round 1 online meetings; 34% (n=18, including 1 from USA, 1 from British Columbia, 2 from Alberta, 1 from Saskatchewan, 1 from Manitoba, 5 from Ontario, 5 from Quebec, 2 from Newfoundland) completed the round 2 Delphi survey and attended the round 2 online meeting. Average time to completion of the two surveys was 32.6 and 30.3 minutes.

Delphi process

After round 2, strong agreement was achieved on 7 of 20 *Evaluation Criteria*, including: *Answerability*, *Potential for translation*, *Effectiveness*, *Maximum potential impact on the burden*, *Equity*, *Relevance*, and *Fills key gap* (Table 1). Seven additional criteria had more variance, and only the *Likelihood of generating patents /lucrative products* had a low median = 3 (25-75%ile = 1-5).

Among 22 *Research Priorities*, four consensus priorities emerged as shown in Table 2. An additional 9 priorities had greater variance while none were low priority (median 1-3).

Fifteen of the 93 *Measures /Constructs /Outcomes* achieved high priority consensus. These included: *Demographic/Environment/Context* (n=4), *Diet and Physical Activity* (n=2), *Formative and Process Measures* (n=1), *Psycho-social Constructs* (n=1), *Body Composition* (n=3), *Biological/Clinical History Measures* (n=4). None were considered of low relevance (median 1-3) as shown in Table 3. Nine statements were categorized as having weaker agreement. For example, *gender (categorical)* and various statements about physical activity fell into this group, as illustrated in Figures 2, 3, 4 and 5.

Participants' Comments and Discussion

Participants' diverse perspectives were evident throughout the process. Varied opinions were identified on diet and physical assessments, and approaches to assess cardiometabolic conditions, in line with issues of feasibility, measurement error, validity and cost based on participants' own research foci and experiences. Several participants emphasized the importance of involving relevant stakeholders (e.g., community partners, policymakers) at all stages of planned research proposal development.

Many participants were not familiar with the Delphi process, or with some of the measures and indicators. There were some missing data as some experts were uncomfortable rating measures that they were not familiar with. Terminology for the anchors (i.e., *Relevant/Not Relevant*) for the 9-point scales were problematic for a few participants. In discussion after the first survey, anchors for sections on *Evaluation Criteria* and *Measures/Constructs* were changed to *Core/Not Core*.

Discussion

The Delphi consensus process is an increasingly popular method to document the degree of agreement for complex topics. To our knowledge, this was the first attempt to use this method to establish research priorities and core measures and indicators specifically directed to lifestyle implementation studies for cardiometabolic conditions. Previous groups have focused on obesity research (19, 25). Participants reached consensus on four of 22 research priorities (Table 2), which indicated that most agree that efforts in our own countries should be directed to uptake/scale-up of current interventions in both the clinical and public health systems.

The addition of explicit consideration of the 20 evaluation criteria was prompted by prior work of the CHNRI in obtaining feedback on priorities from diverse experts (23). Despite our high-income setting, we

felt we might have an analogous situation in which researchers from different disciplinary backgrounds were coming together, and the top-ranked criteria were aligned quite closely with the five CHNRI high-priority “standard” criteria: namely answerability, effectiveness, deliverability, maximum potential for disease burden reduction and the effect on equity. Our results differed from the CHNRI criteria in terms of interventions being deliverable, which likely reflects the greater focus on resource and infra-structure challenges in low- and middle-income countries. Our participants agreed that research with strong potential for translation was core. Our group also agreed that research that could fill a key gap was core, defined as “health research ideas that are more likely to fill the key gap in knowledge that is required for translation and/or implementation than the others”. Generally, participants in this exercise had quite similar evaluation criteria.

With respect to measures, there was less consensus. Our interest in measures of cardiometabolic conditions differed from two other consensus processes for measuring obesity interventions (ADOPT and OBEDIS) (19, 25). The ADOPT measures were focused on explanatory research in weight loss (21), while OBEDIS goals were closer to our own in recommending fewer core measures, but they were still oriented to weight loss treatment (19). Implementation variables, such as formative and process evaluation measures, were not included in either of the previous efforts. Reasons for variability in the scoring of some measures, such as gender and physical activity, warrants further investigation. Additional work on core measures is needed with a larger group, with additional opportunities to discuss strengths and limitations of various measures.

Strengths of this study included an inclusive and transparent process completed in a timely fashion using technology, allowing for both qualitative and quantitative feedback among volunteers in an emerging research network. The use of strict criteria for consensus made it possible to discern a small core set of research priorities for cardiometabolic conditions that have not been documented previously.

Although considered superior to typical committee approaches, in which one or more people may dominate decision-making, the Delphi approach represents the opinions of the participants involved (26). The participants were recruited to a voluntary research network. We worked on the basis of attracting interest and therefore no claims are made that the participants represent the diverse research community with an interest in the topic. Certainly, network participants are a convenience sample of the relevant research community. Wider promotion of the network and review of the findings to date are needed to ensure wider agreement with the priorities and measures currently identified.

Other challenges and limitations included the fact that only one-half of the group started the Delphi process and fewer still were able to complete both surveys. COVID19 shutdowns and changes in March 2020 affected the academic and personal lives of many in this group, which may have had an impact on participation. The implementation of the Quarantine Act by Canada was declared on March 24, 2020, after completion of the first survey (27). Future studies attempting a similar online approach to developing consensus must make additional efforts to keep participants engaged and oriented to the process and goals. Other approaches are likely needed, such as detailed discussion, to review strengths

and limitations of various measures before any rating exercise. The further development of reporting guidelines for Delphi processes in different contexts is to be welcomed (16).

Conclusions

This is the first study to investigate research priorities, core measures and indicators for lifestyle implementation studies for cardiometabolic conditions, which will potentially be helpful to researchers interested in developing lifestyle-oriented research proposals to address cardiometabolic conditions. Through two rounds of Delphi process, we identified that current research priorities should focus on the implementation or scale up of existing interventions in both primary health care and community settings. While less consensus was achieved on evaluating measures/constructs/outcomes, the relevant concepts need to be re-examined with a larger participation group to distinguish the most essential measures from the rest of the list.

We also identified that virtual Delphi process can serve as an efficient methodology for generating research priorities for lifestyle implementation studies. However, the relatively low participation rate indicates that modifications should be made to further engage participants. Detailed orientations on the Delphi process, and discussions on the listed statements should be offered to participants prior to the rating activities.

Abbreviations

- ADOPT: Accumulating Data to Optimally Predict Obesity Treatment
- BMI: Body mass index
- CHNRI: Child Health and Nutrition Research Initiative
- OBEDIS: OBESity Diverse Interventions Sharing
- MRFIT: Multiple Risk Factor Intervention Trial

Declarations

- Ethics approval and consent to participate – Ethics approval not applicable
- Consent for publication – not applicable
- Availability of data and materials – The datasets used and/or analyzed during the current stay are available from P Brauer on reasonable request
- Competing interests – All authors declare that they have no competing interests
- Funding – CIHR Planning and Dissemination Grant. The funder had no role in the design of the study, data collection and analysis or interpretation of the data or writing the manuscript.
- Authors' contributions - Three researchers (PB, SD, RD) initiated the network, obtained funding and guided the process throughout. PB and YW created the online questionnaire, analyzed results and

wrote initial drafts. AL helped initiate the network. AIC, DK, J-PD-C, JR, JH, MLP, RB, SVH and ZH are network members who participated in the process and reviewed and revised the paper. All authors read and approved the final manuscript.

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Tables

Table 1: Agreement with Evaluation Criteria³

Strong Agreement Statement¹	Weaker Agreement Statement²
Answerability	Novelty
Potential for translation	Deliverability
Effectiveness	Sustainability
Maximum potential impact on the burden	Ethical aspects
Equity	Community involvement
Relevance	Feasibility
Fills key gap	Fundability

¹ All three indicators (median, 25th percentile, and 75th percentile) fall between 7-9

² 25th – 75th percentile range falls outside 7-9

³ Criteria rated as Uncertain (did not meet the criteria for Strong or Weaker agreement) were: Attractiveness (some health research ideas will be more likely to lead to publications in high-impact journals); Affordability (the implementation of knowledge generated through some health research ideas will not be affordable within the context); Public opinion; Cost; Alignment with political priorities; and Likelihood of generating patents/lucrative products.

Table 2: Agreement with Research Priorities³

Strong Agreement Statement ¹	Weaker Agreement Statement ²
Evaluating the efficacy and effectiveness of interventions in place	Understanding risk factors
Improving existing interventions for sustainability	Measuring prevalence of exposure to risk factors
Clinical research to advance existing knowledge to develop new capacities	Measuring prevalence of coverage of interventions in place
Public health research to advance existing knowledge to develop new capacities	Improving existing interventions for affordability
	Improving existing interventions for deliverability
	Improving existing interventions for acceptability
	Basic research to advance existing knowledge to develop new capacities
	Clinical research to explore entirely novel ideas
	Public health research to explore entirely novel ideas

¹ All three indicators (median, 25th percentile, and 75th percentile) fall between 7-9

² 25th – 75th percentile range falls outside 7-9

³ Priorities rated as Uncertain/equivocal (did not meet the criteria for strong or weaker agreement) were: Measuring the burden; Health policy analysis; Health system structure analysis; Financing/costs analysis; Human resources; Provision/infrastructure; Operations research; Responsiveness of recipients; and Basic research to explore entirely novel ideas.

Table 3: Agreement with Measures/Constructs/Outcomes

Strong Agreement¹	Weaker Agreement²	Uncertain³
Demographic/ Environment/Context		
Ethnicity	Gender score (categorical)	Gender score (continuous)
Indigenous identity	Access to health care	Alcohol use
Education		Tobacco use
Income		Language
		Work status
		Marital status
		Material Hardship
		Household size
		Health insurance status
Diet and Physical Activity		
Usual dietary intake from 24 hour recalls or food frequency questionnaire	Physical activity record/diary	Type/extent of food processing as indicator of diet quality
Diet quality	Self-report physical activity questionnaire	Steps walked /day record
	Physical activity, sedentary activity, sleep from actigraphy or accelerometer	
	Sedentary behaviours by a questionnaire	
Formative and Process Measures		
Intervention experience of participants in program	N/A	Incremental cost-effectiveness ratio
		Costing of intervention
		Intervention fidelity by activity reporting of interventionists
		Intervention fidelity by observation /recording
		Documentation of involvement of the public in developing the intervention

Strong Agreement ¹	Weaker Agreement ²	Uncertain ³
Psycho-social Constructs		
Quality of Life questionnaire addressing self-care, usual activities, pain/discomfort and anxiety/ depression	General health or well-being	Medication adherence
	Self-efficacy	Perceived stress
		Trait anxiety inventory
		Depression
		Intuitive Eating Scale
		Three-Factor Eating Questionnaire
		Self-weighing behaviour
		State affect
		Emotional eating
		Binge eating
		Trait food craving
		Reward-related eating
		Executive function
		Delay discounting
		Behavioural intention
		Hedonic responses
		Hunger and satiety
		Personality: Big Five factors
Body Composition and Energy Estimation		
Anatomic fat storage	N/A	Expended energy
Weight/height/BMI/waist circumference		Energy expenditure-activity
Energy Intake (overlap with diet measures)		Energy Expenditure – resting metabolic rate
Biological/Clinical History Measures		
Hemoglobin A1c	Menopausal status	Cardio-respiratory fitness at rest - resting heart rate

Strong Agreement ¹	Weaker Agreement ²	Uncertain ³
Lipid profile		Cardio-respiratory fitness - walk test
Co-morbidity score		VO2 max – indirect
Blood pressure		Muscle strength from hand-grip strength
		Glucose area under curve 2h postprandial
		Insulin, glucagon, HOMA-IR, HOMA-B
		Nutrient status
		Fasting glucose (2 times)
		Apo A; apo B
		Cardiovascular disease risk score
		Liver function (Aminotransferases (U/L), alkaline phosphatase (U/L), gamma-glutamyl transpeptidase (U/L))
		Liver function – NFS and FIB4 – fibrosis; platelet count; albumin
		Fatty liver - ultrasound
		Inflammation (IL-6, TNF-alpha, CRP)
		High sensitivity C reactive protein
		Heart electrical activity (ECG)
		Self-report of sleep duration and timing
		Sleep disorders (apnea)
		Age of onset of obesity
		Maximal and minimum weight after age 18
		Variation in body weight in past 3 months
		Previous attempts at weight loss and weight maintained after loss
		Etiology – genetic heritage

Strong Agreement ¹	Weaker Agreement ²	Uncertain ³
		Parental weight history, including maternal bariatric surgery
		Family history of diabetes
		Hunger /satiety - Ghrelin, GLP-1, PYY3-36 (panel)
		Energy homeostasis - adipose tissue-derived hormones (adiponectin, leptin, amylin)
		Thyroid hormones - (TSH, T4, fT4I (panel)
Social Environment and Context		
		BMI of others in social network, objective
		Weight status of individuals in social network, perceived
		Support from social network
		Perceived autonomy support

¹ All three indicators (median, 25th percentile, and 75th percentile) fall between 7-9

² 25th percentile falls outside 7-9 range

³ All others.

Figures

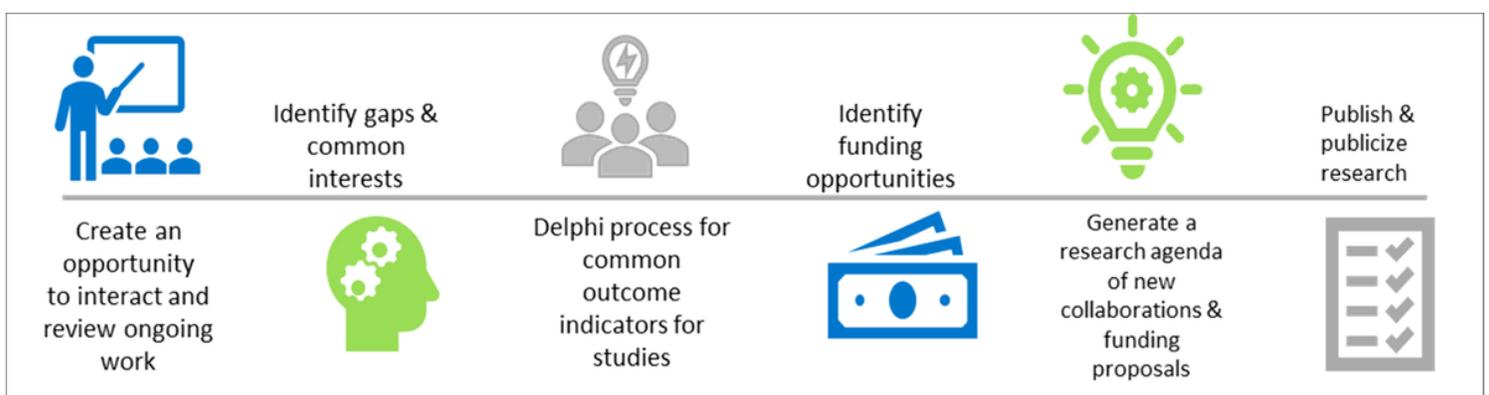


Figure 1

Goals for Research Network

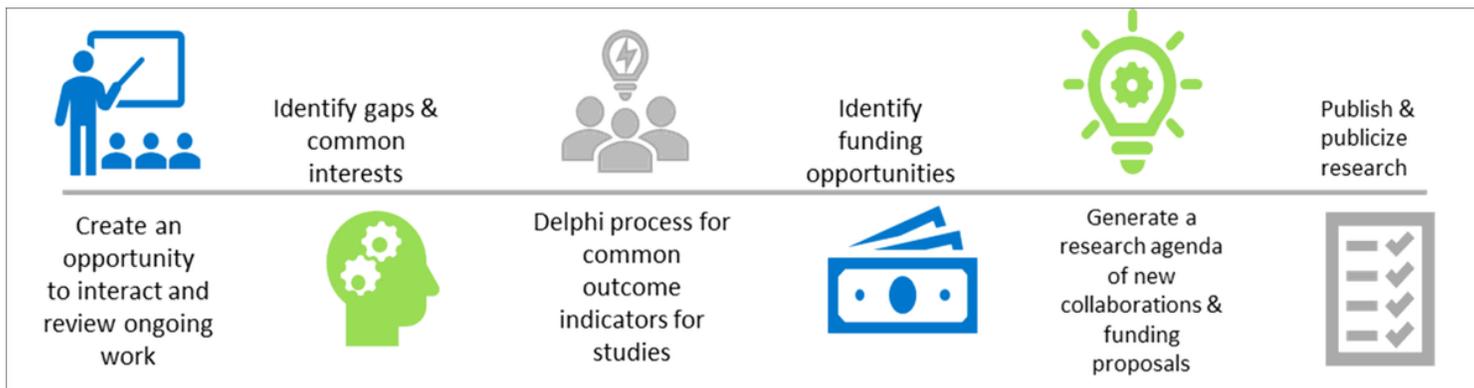


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Goals for Research Network

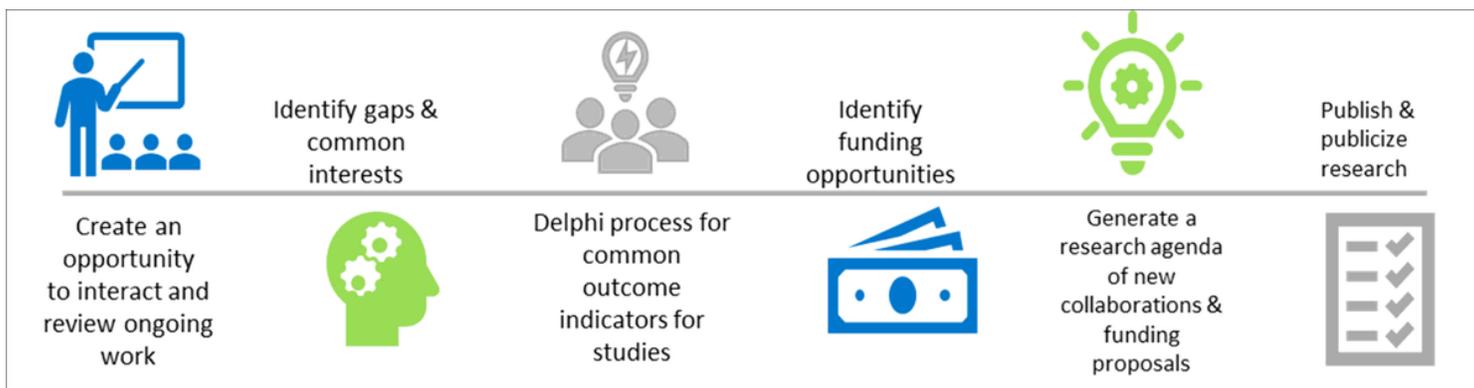


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Goals for Research Network

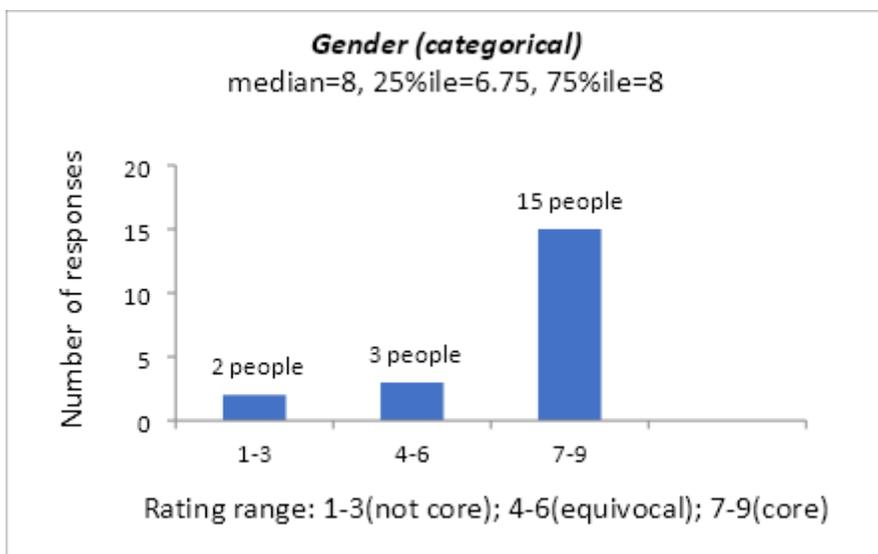


Figure 2

Rated importance of using Gender (categorical) as a measure/construct/outcome for cardiometabolic conditions

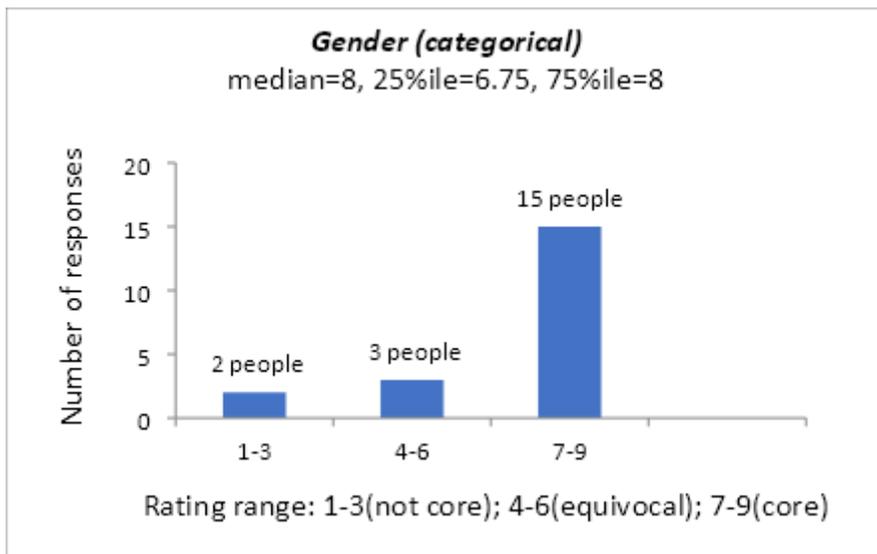


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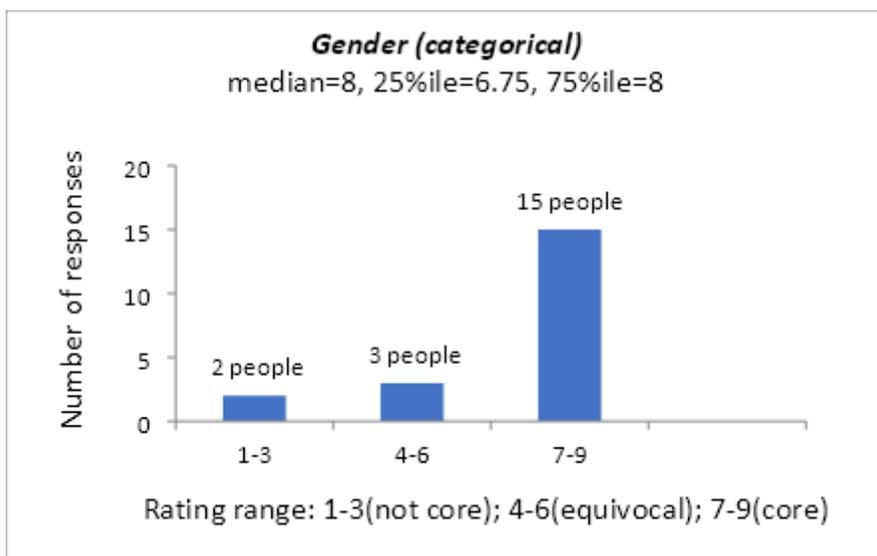


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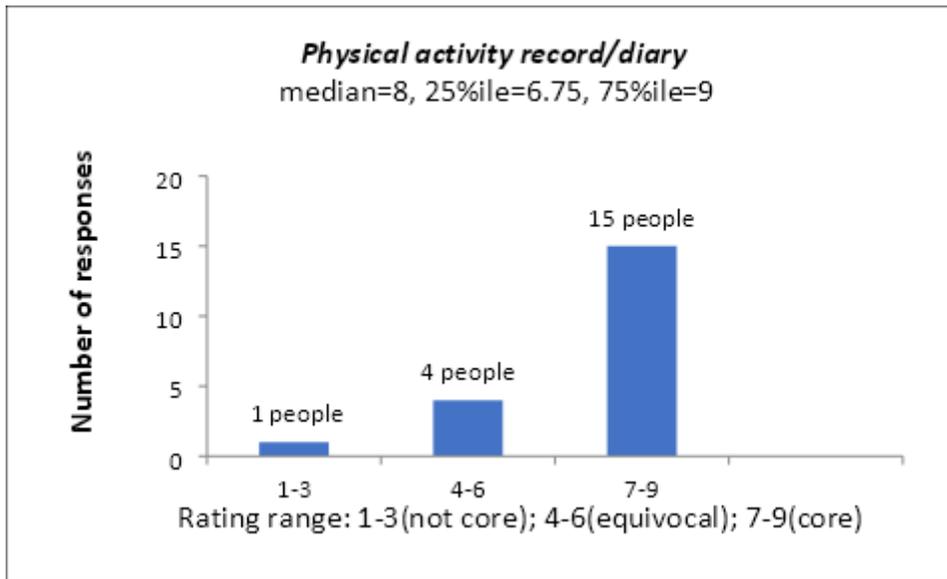


Figure 3

Rated importance of using Physical activity record/diary as a measure/construct/outcome for cardiometabolic conditions

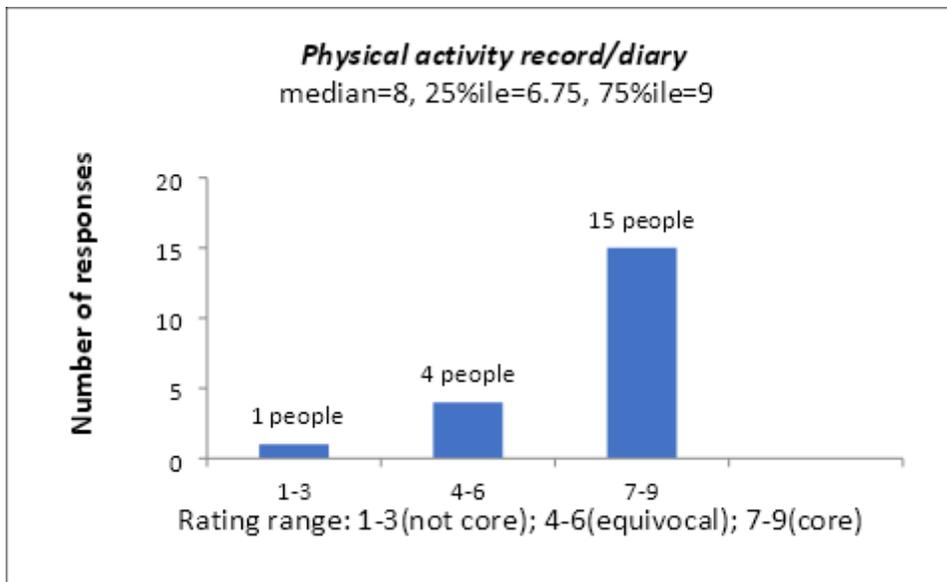


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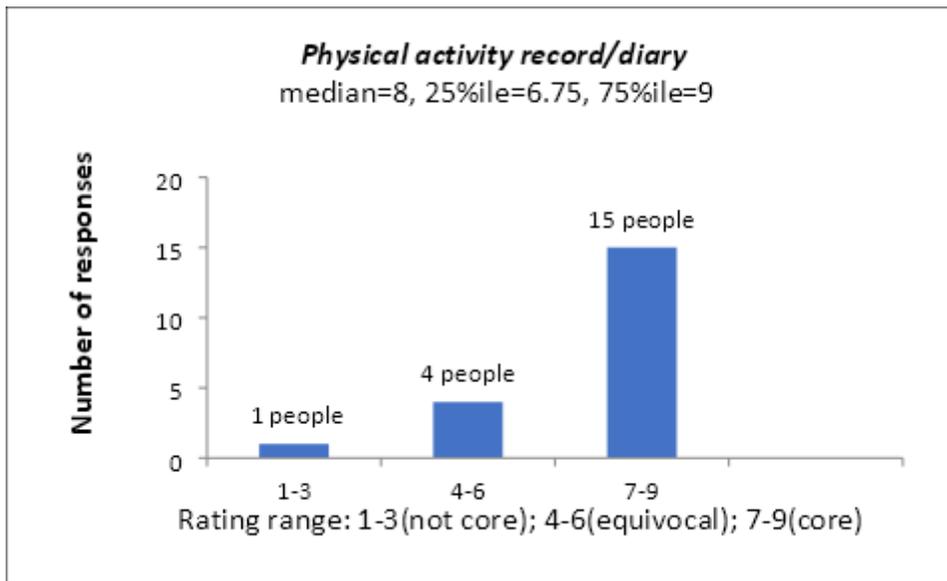


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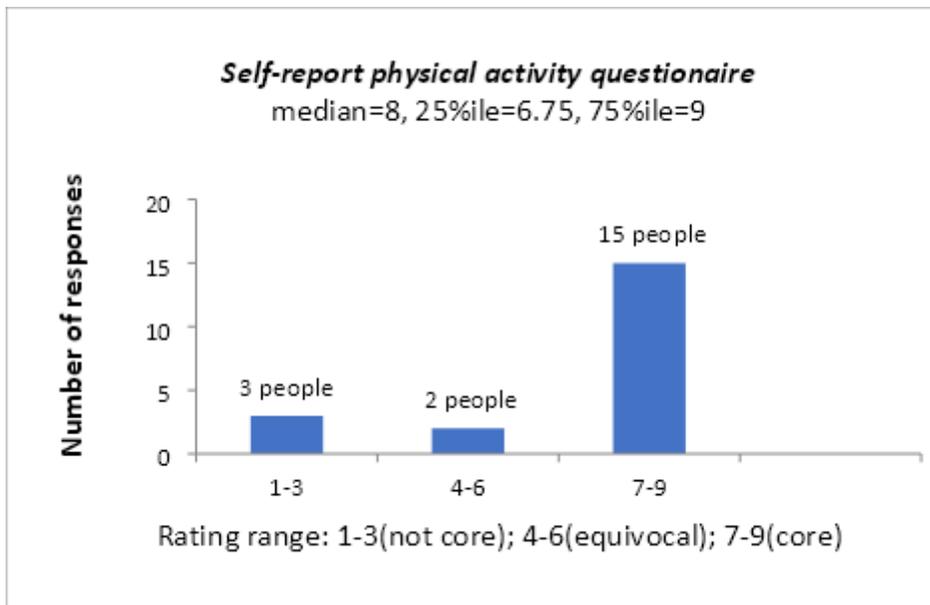


Figure 4

Rated importance of using Self-report physical activity questionnaire as a measure/construct/outcome for cardiometabolic conditions

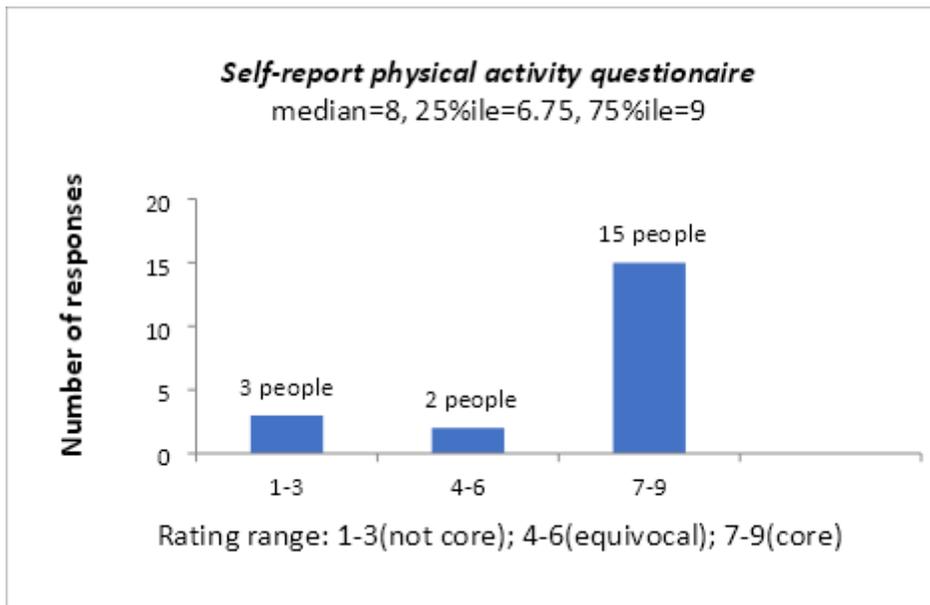


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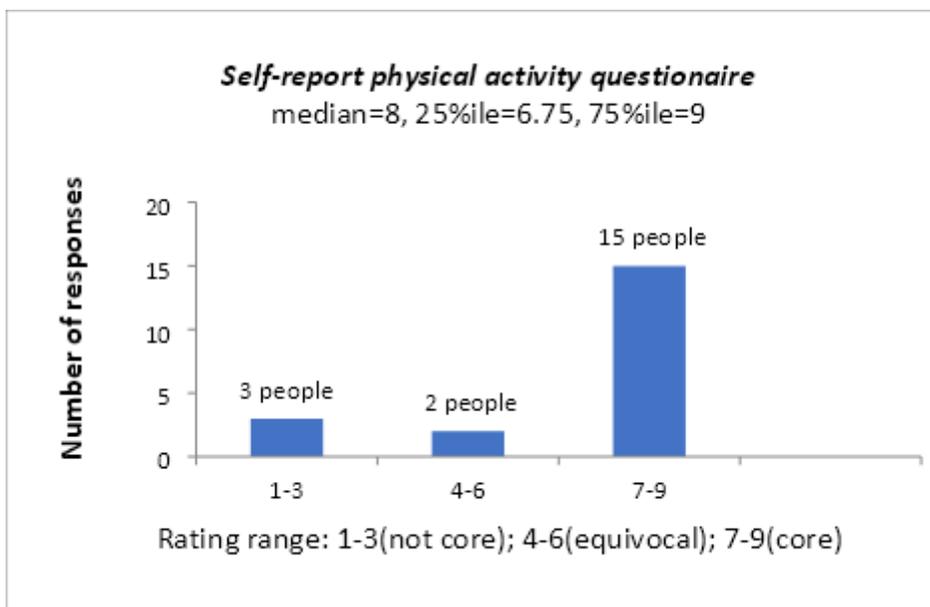


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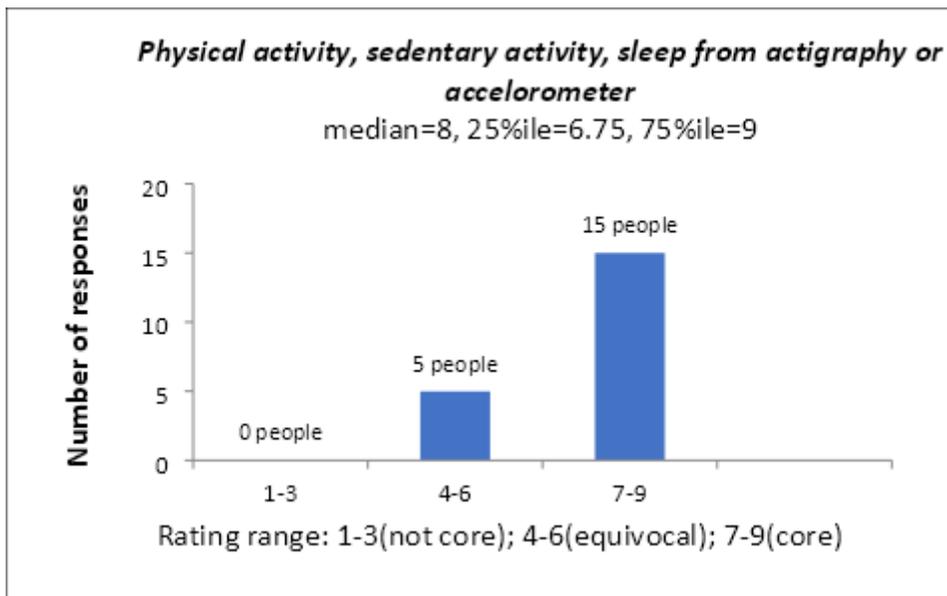


Figure 5

Rated importance of using Physical activity, sedentary activity, sleep from actigraphy or accelerometer as a measure/construct/outcome for cardiometabolic conditions

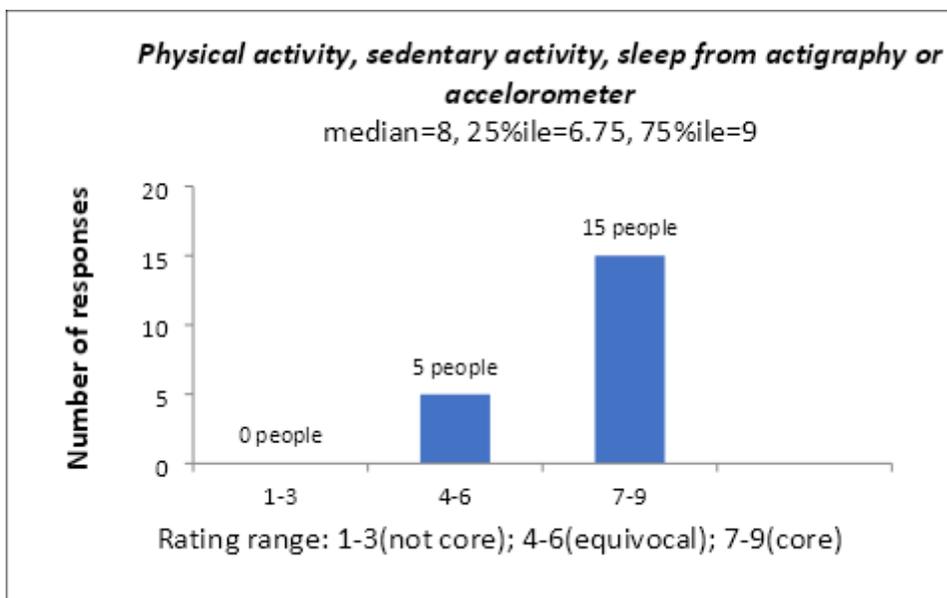


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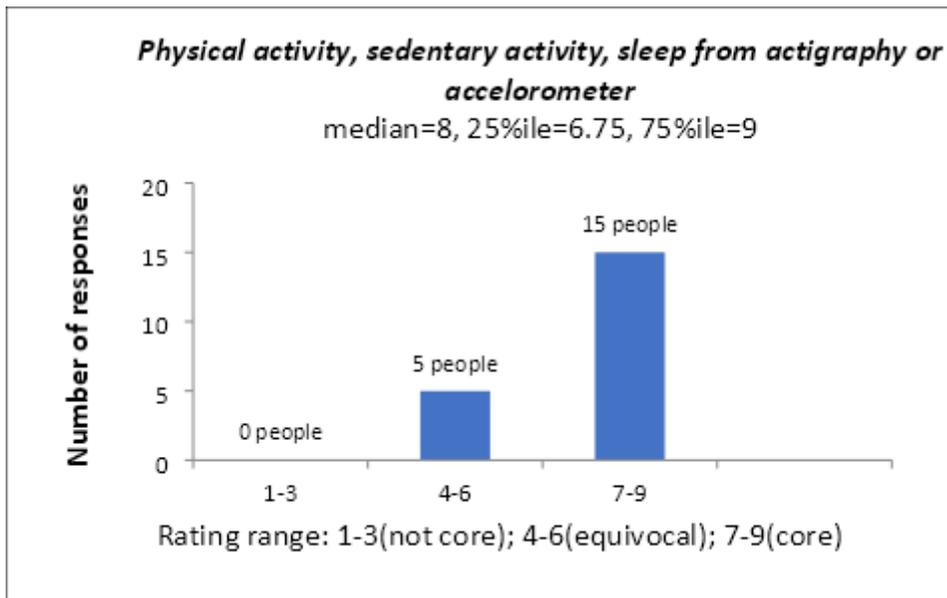


Figure 5

Rated importance of using Physical activity, sedentary activity, sleep from actigraphy or accelerometer as a measure/construct/outcome for cardiometabolic conditions

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