

ORIGINAL ARTICLE

## A Realist Review of Effective University-Based Wellness Programs on Physical Activity, Occupational Balance, and Vocal Health

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### ABSTRACT

**Background:** Wellness programs can be implemented in a university setting and may include varied elements such as physical activity, occupational balance, and vocal health. However, there is limited information that highlights and synthesizes why and how these programs work. Therefore, this study aimed to understand effective programs on physical activity, occupational balance, and vocal health for university constituents in relation to the implementation contexts, mechanisms, and outcomes (CMO).

**Methodology:** Guided by the Health Belief Model in the context of a realist review design, the researchers conducted an iterative search among seven peer-reviewed electronic databases in the health and education fields using a predetermined set of eligibility criteria.

**Results:** The search identified 6564 records, of which programs from 20 records contributed to data synthesis. Nine CMO statements were created, with physical activity programs accounting for most configurations. Key themes identified were tailored and individualized interventions, medium-term incentivization, lifestyle education programs utilizing information and communications technology, interdisciplinary multi-component programs, use of self-monitoring strategies, social support, and shared experiences among employees and students. Analysis of the mechanisms of these effective university programs revealed processes and structures that were consistent with elements of the Health Belief Model.

**Conclusion:** Effective university-based wellness programs on physical activity, occupational balance, and vocal health result from a health-supporting culture among staff and students, utilizing self-based, technological, and social approaches that target and address individual and organizational needs. This realist review provides practical information that may guide the development of university-based programs and policies targeting these areas of wellness.

## Introduction

Wellness is defined as the “optimal state of health of individuals and groups” [1] and can be attained when one “realizes their fullest potential physically, socially, spiritually, and economically, and is able to fulfill the roles expected of them in relevant settings” [1]. It consists of various areas including the physical, occupational, social, intellectual, emotional, and spiritual domains [2,3]. In universities, wellness programs aim to promote a change in the quality of life of students and teaching and non-teaching staff [4]. Among university students, these initiatives may bring about positive physiological, psychological, and behavioral outcomes [5-6]. Meanwhile, similar health promotion programs in this setting are also expected to contribute to increased employee productivity, reduced absenteeism, and decreased healthcare costs [7].

The implementation of wellness programs in this setting may benefit from the inclusion of strategies targeting the physical activity, occupational balance, and vocal health of university constituents. Physical activity is the movement produced during everyday activities and exercises [8]. Occupational balance refers to the subjective experience of having a satisfactory combination of occupations that span across occupational areas [9]. This study centered its scope on an individual's perceived balance of productive occupations (work or school), leisure, and rest. Lastly, vocal health is characterized as the healthy interplay between the physical and functional characteristics of voice [10]. These strategies may help address the increasing prevalence of physical inactivity in this population, the tendency of university staff and students to experience issues in managing different roles or demands, and the increasing risk of poor vocal health due to increased voice use, especially among faculty [11-13].

In the design and development of wellness programs, health behavior theories play a key role in understanding an individual's lifestyle and the various factors influencing it [14]. In turn, this can inform the development of appropriate interventions, identifying indicators of success, and evaluating impact [14]. A number of such theories with varying perspectives ranging from individual to community and cultural contexts have been identified and widely studied in existing literature [14]. For this realist review, the Health Belief Model (HBM) is the theory of choice because of its consistency with a preventive approach to promoting wellness in universities. The theory encourages influencing behavior through understanding and addressing the following: severity of one's health status, susceptibility to adverse health outcomes, perceived benefits and barriers, cues to action, and self-efficacy in adopting a health-promoting behavior [15,16].

This study assumes that wellness programs focusing on occupational balance, physical activity, and vocal health, while utilizing an approach consistent with the Health Belief Model can directly influence the physical, occupational, social, and intellectual aspects of wellness. There is also an indirect impact on the rest of the wellness domains (see Figure 1). To date, no study has synthesized the features of university-based wellness programs in these three health areas. Without this information, it is difficult to ascertain the components that make such wellness programs work. For example, wellness

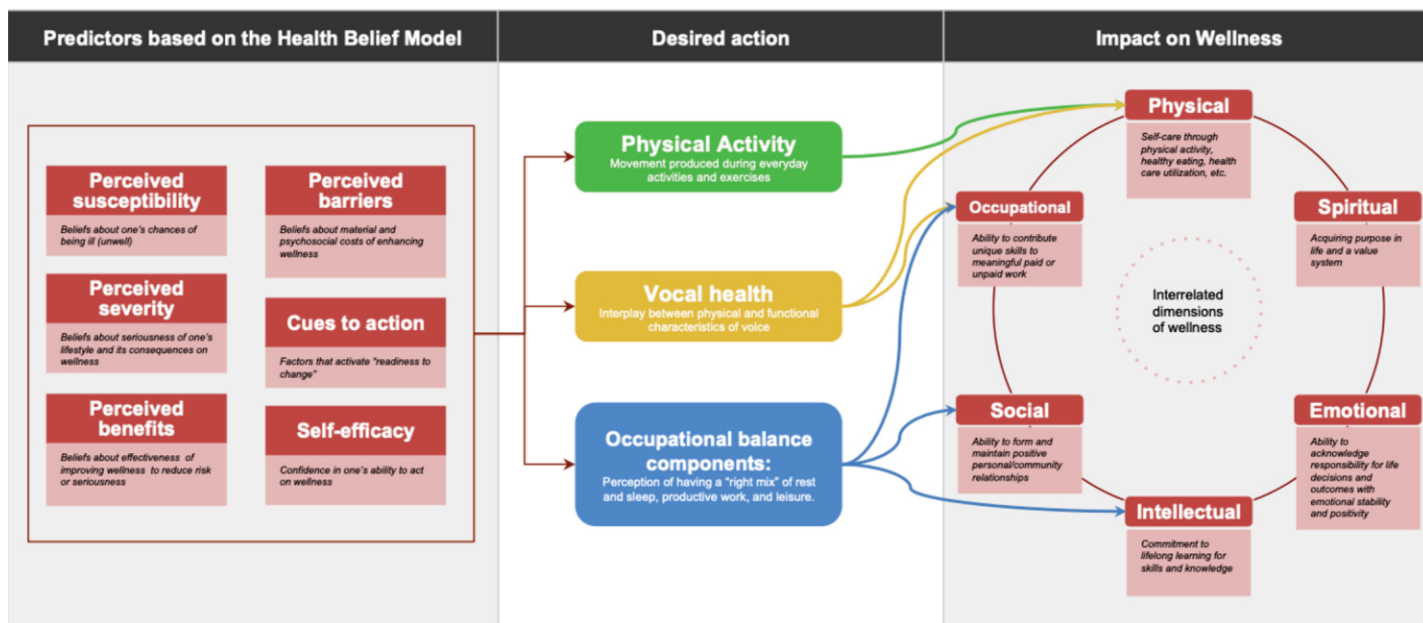
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**Keywords:** wellness, healthy settings, exercise, fitness, work-life balance, voice care

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**Figure 1.** Integration of Health Belief Model constructs with physical activity, vocal health, and occupational balance components and its influence on domains of wellness.

programs for universities may be limited by bureaucracy and organizational structures that may pose limitations to their successful implementation [17]. Meanwhile, administrative support, effective communication, and active participation of its constituents in the planning stages are found to be critical elements for a university wellness program's successful implementation [17,18]. By having an overview of existing wellness programs in physical activity, occupational balance, and vocal health, circumstances and specific approaches that lead to success or failure can also be highlighted.

Thus, this study aimed to understand why and how effective programs on physical activity, occupational balance, and vocal health work for university constituents. Specifically, the study aimed to answer the following research questions:

1. What are effective university wellness programs on physical activity, occupational balance, and vocal health for university constituents?
2. What are the contexts, mechanisms, and outcomes of these university programs on PA, occupational balance, and vocal health?

## Methodology

This study utilized a realist review design to understand effective university-led programs on physical activity, occupational balance, and vocal health for university constituents in relation to their contexts, mechanisms, and outcomes. A realist review uses an iterative process deemed appropriate for complex interventions [19], such as wellness programs. This design can provide an in-depth understanding of what makes effective programs work, specifically the underlying mechanisms that may explain the wellness outcomes in particular contexts [20]. The study protocol was registered to the University of York's International Prospective Register of Systematic Reviews (PROSPERO) with registration identification code CRD42021238461. The University of the Philippines Manila Research Ethics Board also granted the study exemption from ethical review (2021-248-EX).

### 2.1 Scope of the search

Guided by the Health Belief Model, the study aimed to understand why and how effective university programs on physical activity, occupational balance, and vocal health worked for university constituents. Searches were limited to documents in English or with available English translations published online as “gray literature,” or in academic research databases from inception until October 2023. The snowballing of published literature was also performed. Specific to online databases, the following were searched: PubMed, Physiotherapy Evidence Database (PEDro), OTSeeker, Speechbite, Education Resources Information Center (ERIC), Cochrane Library, and Cumulative Index to Nursing and Allied Health Literature (CINAHL).

The following search terms were used: “wellness” OR “health promotion” OR “health education” AND “physical activity” OR “physical fitness” OR

“exercise” OR “occupational balance” OR “life balance” OR “work-life balance” OR “vocal health” OR “vocal wellness” OR “vocal hygiene” OR “vocal training” OR “vocal performance” AND “university” OR “campus” OR “college” OR “higher education” OR “tertiary education” OR “school” OR “workplace”. The search strategy was peer-reviewed by a senior researcher following the Peer Review of Electronic Search Strategies (PRESS) guidelines [21]. The search strategies applied in the different databases are summarized in Appendix A.

Studies were included if they met the following criteria: 1) published online research articles and government documents that described the outcomes of university programs on physical activity, occupational balance, and vocal health, 2) targeted university constituents including students, employed and retired faculty, and employed and retired non-teaching personnel, 3) involved effective programs or those that reported positive outcomes or improvements in physical activity, occupational balance, and vocal health as a result of the intervention program, and 4) single and multi-component interventions or programs delivered individually or in groups, and were conducted by the university. Studies were excluded if they: 1) included children and adolescents aged 15 years and below as participants, 2) investigated programs that were not specifically designed for university constituents, and 3) did not report data to inform the context, mechanisms, or outcomes of the programs.

### 2.2 Selection, appraisal, and data extraction

At least two reviewers from the entire research team independently screened the search results based on title, keywords, and abstract. Eligible studies were then considered for data extraction and synthesis. Any discrepancies or disagreements in the screening and study selection phases were resolved through consensus. The appraisal of included studies was based on the reported positive effects and the relevance of the evidence to the guiding theory [22], in this context the HBM.

The researchers utilized a data extraction form to document relevant study characteristics such as title, authors, publication year, study design, type of document, location, participants, and details of the program. Another form was used to extract information specific to the context, mechanisms, and outcomes of university programs on physical activity, vocal health, and occupational balance. The researchers piloted the standard data extraction forms in two studies to determine the consistency of the results and the need to modify the form accordingly. At least two members extracted the data from the included studies using the form. Comparison and cross-checking of the extracted data were performed, and discrepancies were resolved through consensus.

### 2.3 Data analysis and synthesis

Data pertaining to the document characteristics and the contexts, mechanisms, and outcomes (CMO) of university programs on physical activity, vocal health

and occupational balance were summarized using descriptive statistics. Three members worked together to generate the initial CMO statements. The team was then divided into two sub-groups, who further worked collaboratively on drawing themes and patterns from the rest of the extracted data. All members were involved in analyzing the content of the programs based on the elements of the Health Belief Models. To ensure consistency in identifying and interpreting the components, the draft CMO statements were presented to the whole team for feedback and refinement. All CMOs were finalized through a series of discussions within the entire research team.

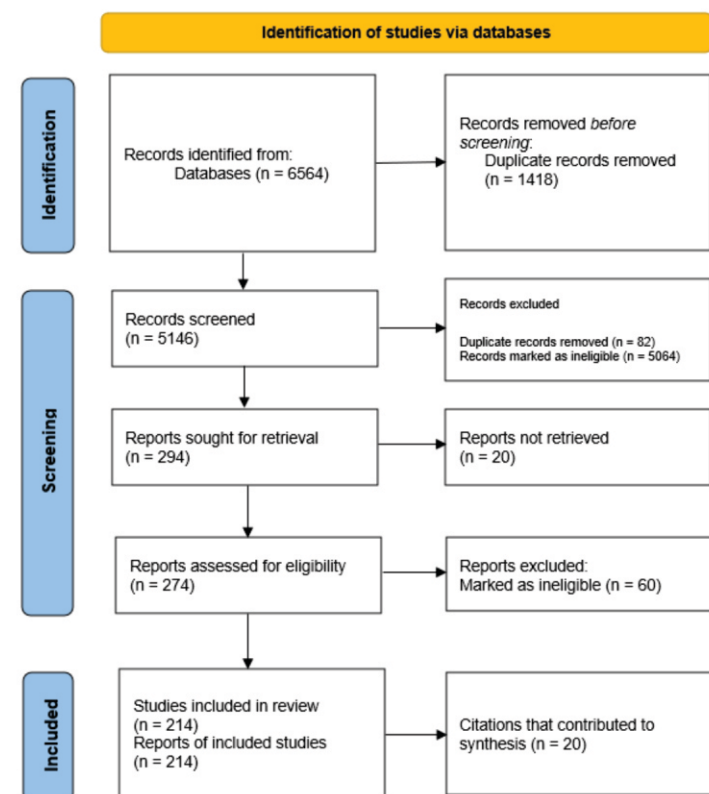
The results of the realist review were presented according to the standards of the Realist And MEta-narrative Evidence Syntheses: Evolving Standards (RAMESES) [23]. Accordingly, data synthesis was presented in two parts: 1) a summary of study characteristics, and 2) a summary of context-mechanism-outcome configurations. A narrative synthesis was also provided to further explain why and how effective university programs in the three areas of interest worked for university constituents through the lens of the HBM.

## Results

The search identified 6564 records. After the removal of duplicates, 5146 articles were subject to title and abstract screening. Upon further examination, the reviewers identified eligible programs from 20 articles for data extraction and synthesis. Figure 2 illustrates the flow and the results of the search.

### 3.1 Study characteristics

Table 1 summarizes the key characteristics of the included studies. Most of the studies presented university programs that focused on physical activity ( $n = 17$ , 85%) [24-40], with few studies that presented programs that addressed occupational balance ( $n = 2$ , 10%) [41-42] and vocal health ( $n = 1$ , 5%) [43]. Most studies were experimental studies ( $n = 18$ , 90%) [24-26,28-35,37-43], and one study published as a narrative report (5%) [27] and another, as a cross-sectional survey (5%) [36]. The programs were implemented in North America ( $n = 13$ , 65%) [24-27,29,31-37,40], Asia ( $n = 2$ , 10%) [28,38], Australia ( $n = 2$ , 10%) [30,39], Europe ( $n = 2$ , 10%) [42-43], and South America ( $n = 1$ , 5%) [41]. Half of the programs catered to university employees ( $n = 10$ , 50%), while the rest of the programs involved university students ( $n = 10$ , 50%). Program



**Figure 2.** PRISMA Flow diagram of search for university programs on physical activity, occupational balance, and vocal health

\*Adapted from Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ* 2021;372:n71. doi: 10.1136/bmj.n71

duration ranged from one month to one year, with two programs [24,36] not specifying the length of their respective programs. Programs comprised area-specific and multi-component strategies targeting health education, health risk assessment, exercise/fitness, training/coaching, self-monitoring, and incentives.

### 3.2 Main findings

Nine CMO configurations of university programs on physical activity, occupational balance, and vocal health were identified (see Table 2). The configurations point to the positive effects of the programs on PA, occupational balance, and vocal health, with PA accounting for most of the configurations ( $n=8$ ). Key themes represented in the nine CMOs spanned tailored and individualized interventions, lifestyle education programs incorporating physical activity and occupational balance, interdisciplinary multi-component programs, use of incentives, self-monitoring strategies, social support, and shared experiences among employees and students. Meanwhile, the contexts across these effective programs ranged from university-supported initiatives to target the health needs of employees and students, varying sizes of higher education institutions taking into account the availability of resources to responding to external influences (e.g., health trends, policies, guidelines) that can affect the health and well-being of the university population. Despite these contextual variations, the programs shared the common aim of promoting a health-supporting culture among staff and students. Analysis of the mechanisms of the programs also revealed processes and structures that were consistent with the elements of the Health Belief Model, such as cues to action, perceived benefits, perceived severity, and self-efficacy. These elements were represented through the use of information materials, discussion sessions, provision of supervision and social support, health risk assessment, and incorporation of self-monitoring mechanisms in the programs using technology, among others. Table 2 presents the details of the configurations, HBM elements, and the corresponding sources of evidence.

## Discussion and Conclusion

This is the first study to come up with a synthesis of evidence that summarizes the contexts, mechanisms, and outcomes of university-based wellness programs on physical activity, occupational balance, and vocal health through the lens of the HBM. Results demonstrated that effective university programs in these areas were those that incorporated and addressed elements of behavior change, such as cues to action, self-efficacy, and perceptions of risks, barriers, and benefits. Further, varying contexts, mechanisms, and outcomes exist that could explain how and why these programs work in the university setting, with most configurations explaining the effectiveness of university-based physical activity programs. The findings of this study contribute to providing evidence that may be applied in designing and assessing university wellness programs and policies targeting physical activity, occupational balance, and vocal health for university constituents.

In the Philippines, this study may contribute to services and policy recommendations responsive to calls for strengthened wellness promotion, including the Sustainable Development Goal on good health and wellbeing [44], World Health Organization's campaign for healthy aging [45], better health programs campaign of the Department of Health (DOH) for senior citizens [46], health promotion areas outlined in the ASEAN Healthy University Framework [47], the DOH Medium Term Health Research Agenda [48], and the National Policy Framework on the Promotion of Healthy Workplace [49]. Thus, the findings are helpful for policymakers and university administrators in designing and implementing programs in these areas of wellness. The results also provide direction for researchers in terms of which mechanisms need to be examined and understood better.

### 4.1 Use of the HBM in understanding effective university wellness programs on physical activity, occupational balance, and vocal health

The adoption of the constructs of the HBM in this study allowed for the identification of underlying mechanisms that explained how and why the implementation of these programs worked in specific university contexts. Although none of the included studies deliberately used the HBM to ground the individual programs, the HBM was able to support the derived CMO configurations given the common elements shared by the HBM with other theories on behavior change [50,51], such as the Transtheoretical Model and the Self-Determination Theory. This realist synthesis implies that using the HBM also provides an alternative lens to understanding the outcomes of

**Table 1.** Summary of included studies.

Citation	Country	Study design	Type of program (PA, VH, OB)	Program	Target constituents	Program components	Program duration	Area of wellness
Allen <i>et al.</i> 2012	USA	Experimental study Cost-effectiveness study	PA	Health promotion program to address health risk	Employees (unspecified)	Health education	Not specified	Physical
Bezner <i>et al.</i> 2017	USA	Experimental study	PA	Program to promote sustainable behavior change	Faculty and staff	Health education Self-efficacy Coaching/training Health risk assessment Incentives	3 months	Physical
Cavallo <i>et al.</i> 2012	USA	Experimental study	PA	Program for improved PA and better social support for physical activity	Students	Health education Self-monitoring Coaching/training Social media Incentives	12 weeks	Physical Social
Donaldson <i>et al.</i> 2016	USA	Narrative report	PA	Program to encourage employees to complete a full marathon or half a marathon by accumulating miles walked or run	Faculty and staff	Health education Self-monitoring Social media	1 month	Physical
Duan <i>et al.</i> 2017	Hong Kong	Experimental study	PA	Program to lead the individual toward explicit intention for a healthier lifestyle	Students	Health risk assessment	8 weeks	Physical Social Emotional
Duffy <i>et al.</i> 2018	UK	Experimental study	VH	Vocal care program	Training teachers (post-graduate students)	Health education	14 weeks	Physical Social Emotional
Ferreira de Sousa <i>et al.</i> 2022	Brazil	Experimental study	PA, OB	Ballroom dancing program to promote occupational balance	Students enrolled in health courses	Exercise sessions/fitness classes (i.e., ballroom dancing) Group activities	8 weeks	Physical Occupational Social Emotional
Haines <i>et al.</i> 2007	USA	Experimental study	PA	Virtual Walking & Wellness Program	Faculty and staff	Health education Self-monitoring	12 weeks	Physical Occupational Social Intellectual Emotional
Hooker <i>et al.</i> 2018	USA	Experimental study	PA	Employer-based monetary incentive program to encourage visits/fitness center utilization	Employees (unspecified)	Incentives	1 year	Physical
Hunter <i>et al.</i> 2018	Australia	Experimental study	PA	Exercise program to be completed at the workplace to promote health-related physical fitness and exercise participation	Employees (unspecified)	Exercise sessions/fitness classes Coaching/training	8 weeks	Physical
Ickes <i>et al.</i> 2016	USA	Experimental study	PA	Program to improve physical activity behaviors, attitudes, and self-efficacy	Students	Health education Exercise sessions/fitness classes Self-efficacy Coaching/training Group activities	15 weeks	Physical
Kwan <i>et al.</i> 2019	Canada	Experimental study	PA	Physical literacy intervention program	Students	Self-efficacy Coaching/training Group activities	12 weeks	Physical Social Emotional
Laura <i>et al.</i> 2022	USA	Experimental study	PA	Lifelong Fitness and Wellness program to promote the well-being of students	Students	Health education Exercise sessions/fitness classes Group activities	15 weeks	Physical Social Intellectual Emotional Spiritual
Ostbye <i>et al.</i> 2015	USA	Experimental study	PA	Employee weight management program	Employees (unspecified)	Health education Coaching/training Group activities	14 months	Physical Social
Pekcetin <i>et al.</i> 2021	Turkey	Experimental study	OB	Web-based intervention program to promote maintenance of healthy time use and activity patterns	Students	Health education	1 month	Occupational
Schneider <i>et al.</i> 2016	USA	Cross sectional survey	PA	Virgin Pulse Health Miles program to promote and incentivize employees who demonstrate healthy choices	Faculty Staff	Self-monitoring	Not specified	Physical
Schopp <i>et al.</i> 2015	USA	Experimental study	PA OB	Chronic Disease Self-Management Program to improve health behaviors as well as reduce outpatient and inpatient service needs	Employees (unspecified)	Health education Self-efficacy Self-monitoring Group activities	6 weeks	Physical Social Emotional Spiritual
Shin <i>et al.</i> 2017	Korea	Experimental study	PA	Program that combining smartcare with financial incentives to increase physical activity levels and reduce weight	Students	Health education Self-monitoring	12 weeks	Physical
Thogersen <i>et al.</i> 2014	Australia	Experimental study	PA	Step-by-step program A lunchtime workplace walking intervention designed to promote walking	Employees (unspecified)	Exercise sessions/fitness classes Coaching/training	16 weeks	Physical Emotional
Zhang <i>et al.</i> 2016	USA	Experimental study	PA	SHAPE-UP A social network-based exercise program aimed at improving physical activity	Students	Exercise sessions/fitness classes Self-monitoring Coaching/training Social media Incentives	11 weeks	Physical Social

**Table 2.** Context-mechanism-outcome statements

CMO statement	Element/s of Health Belief Model	Supporting evidence
Tailored intervention programs that consider barriers for university employees and students at risk for developing lifestyle conditions lead to immediate positive effects on perceived occupational balance and physical activity participation.	Cues to action Perceived barriers	Ferreira de Sousa <i>et al.</i> (2022) Haines <i>et al.</i> (2007) Hunter <i>et al.</i> (2018) Laura <i>et al.</i> (2022) Shin <i>et al.</i> (2017)
A low-resource, individualized vocal care program, tailored to the severity of vocal disorders, has positive effects on the vocal health of training teachers.	Perceived severity Perceived benefits	Duffy <i>et al.</i> (2004)
Medium-term (up to 6 months) incentivized physical activity programs that aim to facilitate change in behavior lead to immediate positive effects on the physical activity levels of university employees and students.	Cues to action	Bezner <i>et al.</i> (2017) Donaldson <i>et al.</i> (2016) Hooker <i>et al.</i> (2018) Schneider <i>et al.</i> Shin <i>et al.</i> (2017) Østbye <i>et al.</i> (2015) Zhang <i>et al.</i> (2016)
Lifestyle education interventions utilizing readily available information and communication technology improve the physical activity levels and occupational balance of university employees and students.	Perceived susceptibility Perceived barriers Perceived benefits Cues to action	Allen <i>et al.</i> (2012) Duan <i>et al.</i> (2017) Laura <i>et al.</i> (2022) Pekçetin and Günel (2021)
Interdisciplinary multi-component programs designed and implemented collaboratively in the university yield positive effects on physical activity levels of students and employees.	Cues to action	Allen <i>et al.</i> (2012) Ickes <i>et al.</i> (2016) Shin <i>et al.</i> (2017) Donaldson <i>et al.</i> (2016) Duan <i>et al.</i> (2017)
Physical activity programs, reinforced with self-monitoring strategies to promote active participation, increased the physical activity levels of employees with limited free time at work.	Cues to action Self-efficacy	Allen <i>et al.</i> (2012) Thøgersen-Ntoumani <i>et al.</i> (2014) Donaldson <i>et al.</i> (2016) Haines <i>et al.</i> (2007) Shin <i>et al.</i> (2017) Schneider <i>et al.</i> (2016)
Social support from role models, moderators, coaches, and the like, who encourages engaged participation, facilitates increase in perceived occupational balance and physical activity among university employees and students.	Cues to action Self-efficacy	Duan <i>et al.</i> (2017) Donaldson <i>et al.</i> (2016) Ferreira de Sousa <i>et al.</i> (2022) Thøgersen-Ntoumani <i>et al.</i> (2014)
Opportunities for shared experiences with peers within an organization provided by the university leads to improved physical activity behavior despite interpersonal and institutional barriers.	Cues to action Perceived barriers Self-efficacy	Cavallo <i>et al.</i> (2012) Donaldson <i>et al.</i> (2016) Schopp <i>et al.</i> (2015) Zhang <i>et al.</i> (2016)
Theory-based physical activity programs that utilize coaching to support university employees' and students' self-efficacy lead to increase in physical literacy, physical fitness, and psychosocial variables related to physical activity.	Self-efficacy Cues to action	Bezner <i>et al.</i> (2017) Kwan <i>et al.</i> (2019) Duan <i>et al.</i> (2017)

university-based programs on physical activity, occupational balance, and vocal health. Further, the HBM can ground the design and analysis of future interventions in these areas.

Analysis of the programs and resulting CMO configurations highlights cues to action and self-efficacy as the most commonly utilized elements to effect change in behavior among university staff and students. This finding is congruent with the wider literature on behavior change that emphasizes the role of internal/personal and external factors in adopting health-promoting behaviors [52]. In the context of university wellness program implementation, results suggest that varying strategies (e.g., self-monitoring, gradual progression, social media, social support) can be adopted to increase the likelihood that university constituents engage in physical activity, occupational balance, and vocal health practices. In contrast, the element of perceived severity was least utilized in the existing programs mainly due to the population of the studies that involved employees and students with mostly no known health conditions.

Further, while the outcomes are not specific to physical activity, occupational balance, and vocal health, our results are quite similar with factors found to be associated with general health and well-being among employees. In a previous study on workplace well-being [53], organizational and leadership support were hypothesized to have positive links with participation in health and well-being practices. It was also associated with a more favorable perception of organizational support towards employee health. This is somewhat consistent with the CMO statements reflecting the role of university support in the design and implementation of tailored interventions and interdisciplinary multi-component programs. This further highlights the potential role of university leaders in ensuring the successful implementation of these programs among employees and students.

Meanwhile, the same study only found a link between incentives and participation in activities, but not necessarily on impact and perception of organizational support. This may mean that incentives alone may not be enough, possibly expanding how this review only found immediate positive effects of incentives in physical activity, occupational balance, and vocal health.

## 4.2 Implications

This realist review is an addition to the knowledge base of university-based wellness programs by highlighting that university-based programs on physical activity, occupational balance, and vocal health can contribute to the role of universities in promoting health among their constituents. The literature on Health-Promoting Universities demonstrates that successful implementation of university programs is anchored on health-supporting policies, physical and social environments, and capacity-building of constituents in various health behaviors, such as physical activity [4,54]. The findings of this review, therefore, support these areas of action as shown by the CMOs encompassing self-based, technological, and social strategies to influence health behaviors. This review also expands the health topics covered by the Health-Promoting University Framework by suggesting the inclusion of occupational balance and vocal health in university wellness policies and programs. Creating policies specific to these areas can further guide and concretize supporting actions for individual (i.e., employee, student) and organizational health.

The derived CMO configurations also indicate that universities have a range of possible approaches to targeting improvements in the areas of physical activity, vocal health, and occupational balance. However, an assessment of individual university context is needed prior to applying the key messages of these configurations. Anchored on elements that address self-efficacy, cues to action, and perceptions of susceptibility, barriers, severity, and benefits, various forms of university processes and resources (e.g., physical/digital infrastructure, human resources, curricular) can be optimized to facilitate positive outcomes in these areas among university constituents.

From an organizational health perspective, university wellness programs which focus on physical activity, occupational balance, and vocal health can benefit from adopting a participatory implementation approach to enhance collaboration among university constituents. This strategy has been recognized as a critical component in the successful uptake of the Health Promoting Universities framework in different cultural contexts [54]. Further, it is recommended to adopt a theory-guided and research evidence-

informed approach in designing, implementing, and evaluating programs in these areas. This conforms with established intervention development guidelines that emphasize the use of a theoretical framework and research evidence in grounding the design, implementation, and analysis of complex interventions [55], such as wellness programs.

Further, this study indicates that physical activity is a well-studied area of university wellness. The CMOs identified can further guide physical activity researchers in identifying emerging developments and gaps in practice and theory utilization which future research can build upon. In contrast, the findings of this realist review also indicate the need to conduct further research examining the effectiveness of university-based wellness programs targeting occupational balance and vocal health among employees and students. The limited number of studies on occupational balance in the university setting can be attributed to the complexity of the construct and its potential overlap with more widely studied areas such as work-life balance and stress [9,56]. Future studies on university-based programs on occupational balance can consider concretizing and contextualizing its scope among university constituents for a more targeted analysis of programs.

Meanwhile, this review also demonstrates that vocal health is not a commonly addressed area of health in the university. Mostly examined in the primary school setting [57], vocal health is increasingly gaining importance among university professors, given its association with vocal fatigue [58]. This highlights an important consideration in the overall study and practice of vocal health among university teachers and extends to the non-academic staff and students. More intervention studies are also needed to further test the applicability of the HBM and the existing CMO configuration for vocal health.

While this study did not identify causal factors for outcomes of the wellness programs, the realist review approach led to an enhanced understanding of the context and mechanisms that lead to good wellness outcomes previously unavailable to policymakers, implementers, and researchers. The CMO statements also highlight how each element of the HBM can play a role in enabling a successful outcome. As HBM shares similar elements with other theories, it may not be too difficult to apply the findings on programs that are founded on other behavior change theories.

The nine CMO configurations result from the methods employed in this study. The search did not include any potentially relevant material that was not accessible as full text online. Future research can explore the inclusion of gray literature in gaining an in-depth and comprehensive understanding of university-based wellness programs in these areas. Further, analysis of the programs and configurations was limited to providing general themes and patterns of the context and mechanisms of the programs. A potential future direction is to determine the interaction and moderating effects of the identified mechanisms to further provide explanatory insights on the outcomes of these programs. Nonetheless, this first realist synthesis on university-based programs on physical activity, occupational balance, and vocal health provides baseline data on existing program configurations and the applicability of the HBM in analyzing the implementation of these university-based programs.

This realist review indicates that effective university-based programs on physical activity, occupational balance, and vocal health result from a health-supporting culture among staff and students, utilizing self-based, technological, and social approaches that target and address individual and organizational needs. These contexts, mechanisms, and outcomes align well with the HBM. Further, university-based physical activity promotion is well-studied, with a range of configurations available for program developers and policymakers to adapt. Meanwhile, university vocal health and occupational balance programs and related research are few. More studies are needed to further understand how and why they can work in the university setting.

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**Appendix A**  
**Search strategies in the different databases**

Database	Search strategy	Yields
PubMed	((university [MeSH Terms]) AND (wellness program [MeSH Terms])) AND (physical activity OR vocal wellness OR occupational balance[MeSH Terms])	261
CINAHL	University AND wellness programs AND Physical activity OR Vocal wellness OR Occupational Balance  AND  University AND wellness programs AND Physical activity OR Vocal health OR Occupational Balance  AND  university programs AND wellness AND physical activity OR vocal wellness OR occupational balance  AND  university programs AND wellness AND physical activity OR vocal health OR occupational balance	502
ERIC	University AND wellness programs AND (Physical activity OR Vocal wellness OR Occupational Balance)	1441
OTSeeker	“Wellness” OR “health promotion” OR “health education”  AND  “Physical activity” OR “physical fitness” OR “exercise” OR “occupational balance” OR “life balance” OR “work -life balance” OR “vocal health” OR “vocal wellness” OR “vocal hygiene” OR “vocal training” OR “vocal performance”  AND  “University” OR “campus” OR “college” OR “higher education” OR “tertiary education” OR “school” OR “workplace”	77
SpeechBite	vocal health program	9
PEDro	physical activity university wellness fitness university wellness work-life balance	20
Cochrane Trials	("wellness" or "health promotion" or "health education") AND ("physical activity" or "physical fitness" or "exercise" or "occupational balance" or "life balance" or "work -life balance" or "vocal health" or "vocal wellness" or "vocal hygiene" or "vocal training" or "vocal performance") AND ("university" or "campus" or "college" or "higher education" or "tertiary education" or "school" or "workplace")	4206
Cochrane Reviews	((("wellness" or "health promotion" or "health education") AND ("physical activity" or "physical fitness" or "exercise" or "occupational balance" or "life balance" or "work -life balance" or "vocal health" or "vocal wellness" or "vocal hygiene" or "vocal training" or "vocal performance") AND ("university" or "campus" or "college" or "higher education" or "tertiary education" or "school" or "workplace"))	49