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Review Article

Impact Social, Environmental, Physical Fitness and Psychology on Physical Activity among Hearing Impairment Adolescent Girls': Theoretical Model

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Abstract

Much work has already been conducted in laying the foundations for physical activity (PA) in adolescents, whereby routine involvement in PA comprises a vital part of a healthy and active lifestyle. To achieve a healthy lifestyle, the determining factors of PA among adolescents should be well understood which would in turn lead to intervention strategies promoting PA behaviors. Recommendations for increased PA have been integrated with many guidelines, including those from the world health organization (WHO) with the 'move for health' program. However, despite all these guidelines, there are still many people reported to be physically inactive. This study aimed to investigate the success factors related for social support, environmental, psychology and health-related fitness for PA among adolescent girls with hearing impairments. By utilizing three well-known theoretical frameworks to further investigate the barriers and facilitate PA among this age group: Social cognitive theory (SCT), Theory of planned behavior (TPB) and Self-determination theory (SDT). A model was proposed to improve PA level in Iraq. Utilization of other frameworks was not recommended according to the literature as it implies different needs, making it difficult to fit certain cultural or geographical conditions in Iraq. The social support, environmental, psychology and health-related fitness factors have been investigated as the main antecedents that may affect the PA level for adolescent girls with hearing impairments. This help to combine and verify the relationship and effects among the proposed factors and domains in the model.

Key words: Physical activity, hearing impairments, self-efficacy, social support, environment, health-related fitness and a model

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Physical activity is recognized to have important benefits for all segments of the population. According to WHO¹, PA is any motion that consists of energy consumption. Becoming physically active during childhood and adolescence is significant for physical, mental and social well-being². This is so because improvement of physical activity behaviors is likely to persist into adulthood³. Activities such as jogging, cycling and other activities of typical day-to-day living (e.g., shopping, cleaning, climbing stairs) have been identified as effective ways for children and adolescents to take part in physical activity which is crucial to their health⁴. The children and adolescents who engage in regular PA tend continue being active throughout their adult lives⁵. Consequently, more attention is being placed on understanding the environments and policies that support lifelong PA and active transportation⁶.

Regular PA has been shown to benefit various body systems, such as cardiovascular, respiratory, musculoskeletal, nervous, endocrine and immune systems⁷. Therefore, PA plays a major role in optimizing health and reducing the risk of obesity and other chronic diseases⁸. Various health benefits arise from participating in PA: it decreases risk of obesity and independently decreases morbidity and mortality. It has already been well-established in the literature that regular physical activity bears important benefits for health⁹. Information also shows that physical activities are beneficial to health during childhood and adolescence. Suggestions for increased physical activities have been integrated with many guidelines, including those from the World Health Organization (WHO) with 'move for health' program¹⁰. However, regardless of all these guidelines, there are still many people reported to be physically inactive¹¹.

A negative outcome of inactivity is an elevated risk of developing obesity at any age. Childhood inactivity has increased substantially within the past 25 years. Although, a plethora of evidence has substantiated the health benefits of regular physical activity for people, those with hearing impairments are far less likely to engage in physically active lifestyles than those with normal hearing. Many research have been conducted for physical activity among normal hearing^{12,13}, while limited research for physical activity among hearing impairments. A study has reported that children aged 6-11 years with hearing impairment have decreased levels of PA participation than peers with normal hearing¹⁴. Deaf children have been shown to lag behind in motor skill development than their normal-hearing counterparts. On the

other hand, when those with hearing impairments are more involved in sports and PA, the deficiencies of motor skill development have been shown to be greatly lessened⁵.

The adolescent girls as found in the prior researcher, have less activity than their peers' boys¹⁵. Especially, in Iraq, adolescent girls have less participated in such activity regarding the sociality and culture. Hearing problem among hearing impairment individuals may cause to reduce self-efficacy level. Also, could effect on their communication with normal hearing peers. In general, the communication between normal hearing and hearing-impairment individuals are still in trouble for adolescent and children in the social life¹⁶. The difficult in equipment access around also could lead them to be inactive. According to the interview conducted in Kurdistan-Iraq, the researcher found that adolescent hearing impairment girls have low attention from social support and government. These reasons encourage the researcher to design a model by identify the success factors and highlighted the issues. Therefore, the researchers in the present study tried to highlight the modeling gap revealed in the previous literature to overcome inactivity problems and ensure the optimization of physical activity among hearing impairments adolescents girls. In which needs to careful recognition to a number of factors from several aspects that include social support, environmental, psychology and health-related fitness. Regarding related aspects, the depth understanding for in terms factors based on the supported theories could provide weight view for decision-maker regarding improve physical activity level for hearing impairments girls' adolescents and encourage them to participate with physical activities.

REVIEW

In this study, literature survey was carried out in order to gather related information needed to determine successful determinants in physical activity for female adolescents with hearing impairments. These determinates could lead the project to develop in successfully^{17,18}. In addition, to review the related theories needed to construct the proposed model of this study.

Theoretical understanding

Social cognitive theory (SCT): The Social Cognitive Theory (SCT) was developed by Bandura¹⁹. This theory proposes that learning within social contexts take place within dynamic and reciprocal social exchanges among individuals, environment and behavior. As the individual perceives models and develop

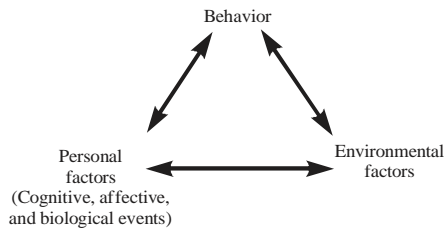


Fig. 1: Social cognitive theory

self-efficacy, the confidence to accomplish a particular task also ensues. The SCT is behavior theory that has been applied to the PA domain and asserts that PA can be predicted by PA self-efficacy and environmental support. The theory further provides a comprehensive framework for understanding social cognitive factors as self-efficacy, physical environments and PA behaviors (Fig. 1). The SCT is founded on four assumptions. firstly, behavior is goal-directed; secondly, human beings are self-reflective agents; thirdly, human beings are capable of self-efficacy and fourthly, reciprocal determination refers to personal, environmental and behavioral factors interacting on a quid-pro-quo basis²⁰.

Thus, the theory asserts that social behavior depends on constant reciprocal interaction among aspects of both the environment and the individual. The main personal concepts to comprehend behavior comprise as follows: skills, self-efficacy and outcome expectancies. Skills refers to the capability of performing behavior upon desire, self-efficacy to the belief that one is able to execute a particular action and outcome expectancies to the belief that actions lead to an expected result. It was previously reported in the literature that primary resources contained within SCT.

It was reported earlier that the main resources included within SCT comprise skills and self-efficacy in executing certain behaviors⁶. Due to the fact that measuring and studying skills are difficult, self-efficacy has thus been highlighted in numerous studies²¹. Therefore, SCT has been popularly employed in the literature, targeting the comprehension of PA among children and adolescents. Scientific data illustrated that environmental factors (e.g., bus services, shopping, exercise facilities and equipment, neighborhood safety and places for walking and cycling) and personal factors (self-efficacy) are significant determinants of PA among children and adolescents²². These environmental variables, comprising physical and social surroundings, have a definite impact on attitudes towards PA. Personal variables impacting attitude include cognitive processes, which include self-efficacy, outcome expectancies, enjoyment and self-regulation strategies. The self-regulation strategies further include planning, organizing and managing aspects. Behaviors and

attitudes are learned by an individual by way of observing other individuals while at the same time receiving behavioral and equipment supports. Accessing these exercise equipments and their availability have an impact on self-efficacy to increase PA as well²¹.

According to SCT, adolescents, who believed they have access to safe places and safe neighborhoods to engage in PA, have stronger feelings and higher self-efficacy of being in control of their participation compared to children and adolescents who are more fearful²³. One study reported that adolescents, especially females, who live in the large inner city where a variety of barriers likely hampered their ability to be physically active this lead to decrease self-efficacy. For example, in urban settings parents may be concerned about their children's safety, especially for females and may limit their opportunities to engage in PA outside. Parents concerned about unsafe neighborhoods lead to lower self-efficacy among adolescents girls, which lessens engagement of PA²³. Furthermore, adolescents have been shown to spend a significant portion of their time in schools. Schools have an important role to play in encouraging PA on school grounds.

Theory of planned behavior (TPB): The Theory of Planned Behavior (TPB) was first introduced by Ajzen²⁴. It is one of the most extensively used theories in the PA domain and provides a theoretical framework through which factors may be understood (Fig. 2). According to this theory, there are three types of beliefs that influence behavior. First, behavioral beliefs are characterized by an individual's perceived positive and negative evaluation of a behavior, causing them to form his/her attitude toward the behavior (e.g., it is fun and enjoyable but also time-consuming)²⁵. Second, normative beliefs are typically generated by individual perception of engaging in an activity simply because others in society close to the individual encourage that activity. The stress perceived by an individual may be considered as subjective norms. This stress, which may either originate from society or other form of anxiety, may compel individuals to execute certain behaviors. Third, individual perception of possessing the relevant resources, power and skills to execute particular behaviors may be referred to as control beliefs. In other words, PA is more likely to be participated in by individuals who actually possess the skills to perform effective PA²⁶.

An extension of the theory of logical action, TPB denotes that individuals normally behave sensibly as whatever they actions they perform originate from their intentions²⁴. These intentions have a definite impact on behavioral activities. In relation to PA within young children, it is observed that

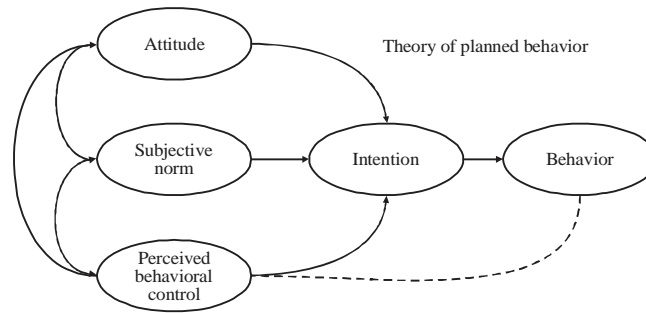


Fig. 2: Theory of planned behavior

children as well as adolescents who are convinced of the pleasure or enjoyability of an activity bear higher self-efficacy and personal benefits to engage in PA. It is further assumed that children and adolescents viewing PA as pleasurable, contented and low-demand, would more likely lead an active life, possessing higher levels of self-efficacy. One study examined the notions of therapy for planned behavior in order to develop PA intentions within individuals²⁷. The study further observed that quality of intentions was a deciding factor in PA engagement, whereby stronger intentions for PA would lead to higher possibility of stimulation to engage within those activities. Furthermore, the personal traits of the individual also play a crucial role in forming intentions of individuals to partake in PA. The aforementioned themes correlate closely with self-efficacy, whereby the motive or drive of individuals leads to higher intentions to partake in PA²⁷. The researchers, Bellows-Riecken *et al.*²⁸ compared the products of TPA to two types of PA: exercise and lifestyle. It was hypothesized in the study that TPA is more reliable for describing structured PA behavior as well as spontaneous lifestyle PA.

Exercise, rather than lifestyle, is more closely related to the construct of apparent behavioral control. Thus, it is implied that exercise is an activity which is planned in advance, structured, variant depending on level of intensity, duration of exercise and frequency of activity among others. On the other hand, lifestyle PA refers to a more leisurely, home-like activities, from golf, using stairs instead of elevator, mowing the lawn and so on Bellows-Riecken *et al.*²⁸. One more detail to note is that PA possessed a high mean score for PA intention among children and adolescents. Thus, this denotes that these participants carried out mid to high-intensity exercise activities while having medium levels of lifestyle PA. In turn, the quality and strength of participants' intentions and self-efficacy toward exercising was of more importance to them than lifestyle PA. Even though the attitudes, subjective

norms and perceived behavioral controls were able to prognosticate the attachment to routine fitness, intentions were the main predictors of reported PA²⁹.

Self-efficacy, is a popular moderator utilized in many studies. For the present study, self-efficacy has been employed to moderate the relationship between intention and PA among adolescents in a wide variety of behavior types. A survey conducted of 1,797 adolescents have shown that self-efficacy was able to explain 74% of the variance to be physically active³⁰. Furthermore, Luszczynska *et al.*³¹ carried out a study comprising two cluster randomized experimental studies using samples of 58 diabetes patients and 187 active individuals. The results corroborate the moderator role of self-efficacy for usage in the PA-intention relationship.

According to TPB, the beliefs of health-related fitness and self-efficacy would increase participants intentions and subsequent engagement in healthy lifestyle and PA behaviors³¹. The theory may also be able to be utilized to explain behavior of children and adolescents with strong self-efficacy to engage in MVPA in comparison to those possessing lower levels of self-efficacy. Intentions may also be thought of influencers of social expectations (in other words, subjective norms), as well as individual attitudes and perceived control. Further, adolescents possessing positive attitudes toward MVPA tend to be inclined to possess strong intentions and higher levels of self-efficacy in comparison to children and adolescents with negative attitudes²⁵.

Finally, children and adolescents who feel healthy in their body weight and in control of performing PA have been reported to possess high levels of self-efficacy and intentions to participate in MVPA in comparison to adolescents with lower perceived control. Adolescents of positive attitudes, strong perceptions of subjective norms and perceived control tend to show more enthusiasm in engaging in MVPA in comparison to adolescents reporting negative attitudes²⁵. Consistent with the TPB is also hypothesized in the present

study that perceived behavioral control would directly influence MVPA and mediate intentions³⁰. The TPB is able to explained the maintenance of health and physical exercise behaviors for predicting both physical fitness exercise and resistance training in the investigation, suggesting that increasing positive attitudes and subjective norms could increase fitness exercise behavior. Interventions should address the psychological benefits of exercise such as feeling better about oneself and reducing stress, as well as the physical benefits of improving health and looking better physically. Interventions should also capitalize on the fact that individuals, most likely to be young people in particular, appear to fitness exercise for reasons unrelated to their long-term health or in other words, to spend time with friends and partners³¹. Furthermore, adolescents who intrinsically motivate PA and possess high self-efficacy tend to be more fit and thereby likely to be more active. Studies have demonstrated that physical fitness is closely associated to motivations for PA³². Adolescents, who are inactive are less physically fit, feel less competent and find PA less pleasurable and intrinsically rewarding.

Self-determination theory (SDT): Self-determination theory was developed by Deci and Ryan³³. It is one of the most popularly employed theories for PA, providing a theoretical framework upon which the role of motivation-related variables for a relationship between perceived social support and intentions for PA may be derived (Fig. 3). It was further surmised that motivation is affected by social factors and that the social factor/motivation relationship may be mediated by way of psychological needs³⁴. The SDT constructs, autonomy, competence and relatedness are closely correlated to PA. Recently, there has also been an increased usage of SDT for PA applications. The SDT proposes that motivation and three types of psychological needs (autonomy, competence and relatedness) are affected by social factors²⁰. The first of the psychological needs, autonomy, is defined as perceived choice of an individual, such as willingness to be involved in PA or

having the choice to select among PA. The second psychological need, competence, refers to the perceived skill in executing PA tasks, in the same manner as self-efficacy. The third psychological need, relatedness, refers to the level to which an individual engages with other individuals during PA³⁵. There is evidence to support social factors which are: Parental support, peer influence and parental role modeling. These social factors may be altered to lead to an increase of psychological need satisfaction and thus also increasing PA participation. In general, the parent support effect on the behavior of the disable children as demonstrated by Kamarudin *et al.*³⁶, in which the parent support plays a biggest role in children habit. By way of an example, it may be observed that members of group fitness classes with aerobics instructors encouraging autonomy and boosting morale of its members, see higher attendance rates than those members attending classes where the aforementioned three psychological needs are not met³⁷. Thus, it is suggested that there is a correlation between intra and inter-personal behavior levels.

In the present study, it is hypothesized that the influence of social support on self-efficacy, PA was based on SDT³⁷. This was done so because the theoretical foundations closely relate to how two factors (socio-environmental conditions and psychological) may lead to motivation to partake in PA³⁸. The SDT further suggested that individual motivation is of varying categories depending on behaviors of PA and related cognitive and effective results³⁴. More self-determined categories of motivation (in other words, intrinsic motivation, integrated and identified behavioral regulation) fall under the general labels of 'autonomous'. Intrinsic motivation is dependent on inherent satisfaction which follows a particular behavior. Other types of autonomous motivation are 'extrinsic', meaning that they involve engaging in a particular activity or adapting a certain behavior for purposes other than intrinsic satisfaction³⁹.

Integrated regulation refers to an individual aligning their engagement within a particular behavior with their broader self and identifying the regulation which represents

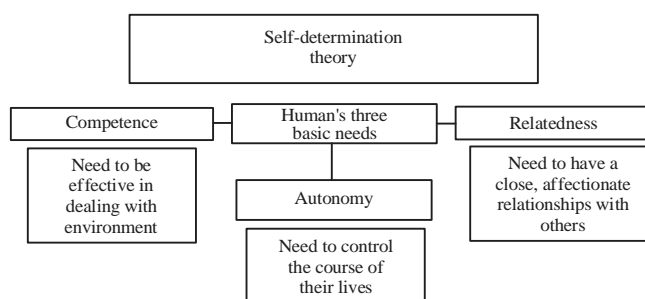


Fig. 3: Self-determination theory

motivation driven by an outcome of value. The outcomes may further be potential to become friends with other individuals or health benefits. Less likely self-determined forms of motivation, such as introjected and external regulation, are generally labeled as 'controlled motivations'. These introjected regulations are essentially motivations based on internal personal stress, including avoidance of guilty feelings. On the other hand, external regulation refers to prods and pushes applied externally to an individual, such as obeying orders or staying away from punishments⁴⁰.

A particular study about PA illustrated that self-efficacy was predicted by introjected, identified and intrinsic forms of regulations. Similarly, another study showed the mediating role of self-efficacy between intrinsic motivation and PA⁴¹. Lastly, one more study concerning adults, illustrated that self-determined motivation mediated relationship between self-efficacy and PA⁴². The main idea behind SDT, competence or self-efficacy, is an anomaly of behavior, as it is hypothesized to bear a strong correlation to self-determined motivation in comparison to behavior. Generally, social domain bears a direct influence on self-efficacy and behavior, rendering it a proximal factor. Studies have shown that children and adolescents not possessing parental motivation lead to more obstacles for PA, especially in comparison to those encouraged by parents³⁴. The parental support provides a better opportunity to enable basic facts in most of the daily activities⁴³. By way of an example, PA may motivate and entertain types of fitness within which adolescents build on their coordination skills, exercise independently and collectively in groups to build bonding friendships and self-efficacy³². Past studies have shown that autonomous PA motivation correlates positively with child and adolescent PA, while also correlating positively with quality of life and self-efficacy^{40,44}.

MODEL'S VARIABLES

Social domain: There is widespread effort to improve PA level and represent important changeable factors for PA among children and adolescents²². Firstly, the social domain of physical activity need to be mentioned, which are as follows:

- **Parental support:** Refers to family as the most impactful microsystem for children. Therefore, parental influence plays a crucial role for children's PA, whereas for younger children with less willingness to participate in PA and control, parents primarily provide support and opportunities for children to engage in PA²⁶. A study conducted for 994 children illustrated the positive

correlation of parental support with PA among children, while also showing that parental facilitation had the most impact⁴⁵. A similar study employing 872 Chinese children and adolescents showed that parental support directly affected PA involvement among children positively⁴⁶. Parental support has been shown to also have indirect effects on PA among children, with evidence showing that parental support may potentially attract children and inspire them to engage in PA due to perceived competence⁴⁷. Thus, parental support grants inactive children and adolescents' acceptance, comfort and self-worth by addressing factors such as self-esteem, anxiety reduction

- **Parental role modeling:** Refers to the role parents play in encouraging children to participate in PA. It has already been corroborated that parental role modeling significantly impacts PA among children²². Other studies have shown that positive parenting practices have successfully incited PA engagement. One study by Ornelas and colleagues⁴⁸ showed that after a year, family bonding, parent-child communication and parental engagement has a strong positive correlation in inciting moderate to intensive PA for males and females, aged 7-13. Another study by King *et al.*⁴⁷ found that parental encouragement to participate in physical activity predicted more frequent PA involvement in 1 week for high school students, ranging from freshmen to senior years⁴⁸. Parents tend to be among the most important agents for children and PA behaviors tend to be the most impactful determinants of child activity patterns. Presumably, parents not only serve as role models but also gate-keepers for PA involvement, influencing children to partake in sports events or registering children for exercise classes or sports lessons²⁶
- **Peer support:** It is an important determinant of PA in children and adolescents. Children's physical activity behavior is influenced by peer support according to social cognitive theory, whereby peer support for PA are likely to be key influences on youth PA. The introduction of sports may come at an early age and be influenced by peers. Peer support can give additional motivation and determination to engage in PA¹⁴. Among adolescents, interacting with friends can lead to several possible outcomes such as cognitive, social, psychosocial and emotional development and behavior of PA²². The communication with their friends could be a help also to increase their behavioral to participate and doing all activities in the school⁴⁹. Garcia *et al.*⁵⁰ studied focus groups to investigate social impacts of PA among

children aged 10-11 years and found that friendship groups were significantly influential on where they exercise and what PA they were engaged in support from friends is regularly and positively related with PA⁵⁰. A study among 600 students aged 11-13 years found that peer support was the highest-ranked factors in relation to MVPA among children and adolescents⁵¹. This concurs with earlier studies, which suggested that perceived support from peers had a significant positive direct influence on PA. For instance, in a recent study of a group of rural high school girls, the peers were found to directly affect the girls' perceptions of PA¹⁴

Environment domain: The environmental domain is an important contributor to an active lifestyle, enabling children to achieve daily physical activity recommendations. Physical environment aspects related to involvement in PA are strong, encouraging individuals to be physically active⁹. The environmental domain of physical activity, includes:

- **Equipment access:** It refers to facilities which can raise children's PA levels. A beneficial association between availability of equipment access and adolescent MVPA has been quite regularly reported²⁰. Recently, several studies have reported that children and adolescents who reside in the location of PA facilities predictably show elevated levels of PA^{9,52}. Furthermore, adolescents living within a 0.75-mile street network buffer of one or more commercial PA facilities were involved in more vigorous physical activities (VPAs). Industrial PA facilities offer children the opportunity to engage in the recommended 60 min of MVPA that children and adolescents should accumulate each day⁵³

Home equipment, whether placed in the house or outside (in the yard) that facilitate or dissuade PA, could have significant impact on PA and sedentary time. It can be predicted that the existence of opportunities to be active (such as sport or recreation equipment in a home) or sedentary (such as the number of television sets or other media equipment in a home) influence PA levels⁵⁴. More chances of being active in the school setting might improve children's and adolescents' PA levels, even in schools with limited sports facilities. Park facilities for PA offer a significant resource that may positively affect PA engagement levels among children and adolescents. Park features (i.e., type of activity area and the adequacy of equipment and supplies) have a positive association with PA in the park²¹

- **Neighborhood safety:** is a very significant determinant of physical activity. This has an essential role to play in how parents and children react to the environment. Despite children having access to PA equipment or supplies, it is crucial that there are no concerns about the safety of the environment which could prevent children from utilizing these facilities⁹

It should be noted that children's views about their neighborhood can alter over time from less positive to positive for PA, probably due to growing awareness of the benefits and nature of their neighborhood. For instance, it is not surprising that over time, their neighborhood is viewed as less hazardous from traffic in adolescence in comparison with their childhood. This is credited to adolescent individuals' learning of motor skills and traffic awareness skills, allowing them to walk and cycle surely in the vicinity of their neighborhood²⁰

Safety concerns may prevent them from using the accessible playground, parks or gyms. However, barriers, including crime, traffic speed, dogs have an inverse association. There is growing evidence on the link between certain built environments, especially outdoor safe spaces like parks and playgrounds and elevated PA levels⁵⁵

- **Place for walking and cycling:** A place for cycling and walking for transport and walking for recreation and exercise can contribute significantly to total physical activity. At neighborhood level, among adolescents aged 11-17 years, the lack of sidewalks, proper pathways and unsafe spaces for walking and biking in the neighborhood and safety factors are positively associated with PA, defined as <150 min/week of moderate PA or <60 min/week of vigorous PA. Consistent with western studies, this recommends that positive areas for walking and cycling may assist in the PA of children and adolescents with D/HI in Asian countries⁵⁴

A search of the transportation research and urban organizing literature reveals that easy pedestrian access to nearby destinations has a relationship with active transportation choices, especially walking. Therefore, the choice of neighborhood could be for the purpose of moderating the relationship between walkability and walking behavior⁸. Poor housing is an important cause of a large number of health problems, which have challenged public health authorities. Apart from the condition of the actual housing unit, the physical and social environment of the home have been shown to also influence residential health behavior. While

neighborhood impacts on health have been well documented in recent decades, the significance of the residential environment in determining health behavior is a modern niche for further research. In the past 10 years, the relationship between home environment and health behavior has garnered much interest⁵⁶

- **Access to services:** The availability of services such as stores, general public transportation, neighborhood market store, etc. significantly impacts person to be much more active. Walking to shops and walking as a form of exercise are important contributions to adolescent's PA⁸. Neighborhood locations, access to parks and living near green areas are positively associated with MVPA. People of a higher socioeconomic position are likely to be more active in their recreational time but walking for transportation seems to be more significant among those of the lower socio-economic class who may not have quick access to their own transport and who use transit more regularly²¹

Health-related fitness: Within the past three decades, the percentage of overweight children and adolescents has more than tripled. This can be accredited to widespread lower involvement in PA⁵⁷. The unfortunate fact lies in that children and adolescents with hearing disabilities generally tend to possess much lower levels of health-related fitness due to physical and psychosocial constraints⁵⁸. Gisladdottir *et al.*⁵⁹ have previously illustrated that the involvement in routine PA has led to greater energy levels and lower risks of chronic diseases such as heart disease, cancer, diabetes and osteoporosis. Furthermore, routine involvement in PA has also been shown to significantly improve psychological health, lowering illnesses such as depression and anxiety⁵⁹. The health-related and fitness components will now be discussed as below:

- **Body composition:** It may be considered a component of both health-concerned fitness and metabolic fitness. Most experts concur that body composition should be categorized as a health-related component of physical fitness⁶⁰. The important benefit of body composition entail good health. Among children and adolescents, improving PA and body composition should be considered not only for their health effects but also for their potential to impact psychological profiles. A higher percent fat or BMI may lead to lower PA among children and adolescent⁶¹. Significant correlation between daily

steps PA and percent body fat, higher a student's percent body fat, the less active the student is both during and after school. Numerous other studies have concurred with this finding, determining that children who are overweight or obese are less active than children who are of normal weight^{59,62,63}. Regarding the relative percentage of muscle fat, bone and other tissue that comprise the body, a fit person may possess a low percentage of body fat. Academic performance may be enhanced greatly by leading an active lifestyle, staying physically fit and maintaining a healthy body composition during childhood and adolescence⁶⁴

Studies have shown that higher BMI correlates with lower levels of self-efficacy for PA, including weight status projected by physical self-efficacy. It is important to note that adolescents possessing greater levels of BMI tend to engage in less PA. Thus, evidence from studies suggested that there is a strong correlation between physical self-efficacy and body composition. Higher levels of BMI tend to lead to lower self-perception of physical effectiveness⁶⁵. Lower self-efficacy (physical) may arise from excessive weight, contributing to heightened concern with self-efficacy to execute physical actions. A rise in BMI and decrease in self-efficacy (physical) score typically tends to rate someone as overweight or obese. The overweight and obese individuals may possess self-perceptions of obesity making him or her unable to engage in PA effectively. Thus, children and adolescents categorized under 'obese' tend to circumvent PA in order to avoid judgement from peers. This results in a vicious cycle within which a large portion of individuals who are not fit and obese are left out, leading to greater obesity and health risks⁶⁶

- **Aerobic capacity:** The aerobic performance is an important health marker for the childhood and adolescence stages in life⁶⁷. Greater levels of aerobic capacity have been credited to lessen mortality in adults and cardiovascular disease risks among children. Furthermore, there is evidence showing that fitness greatly translates from the childhood stage in life to adulthood⁶⁶. Aerobic capacity is also defined as the ability to deliver oxygen to muscles, allowing physical exercises to extract energy from the intake oxygen to fuel muscles. Thus, there is also a reliance on pulmonary, cardiovascular and hematological components for oxygen intake and oxidative mechanisms for the muscle in question⁶⁸

Some researchers have suggested that aerobic capacity bears a vital role in adoption and maintenance

of PA engagement, especially among adolescents⁶⁹⁻⁷¹. One such study has suggested that children and adolescents with high levels of self-efficacy tend to show better health and volition to engage in certain aerobic exercises⁶⁹. A study on adolescent studies highlights the enjoyment the sample size received from aerobic capacity in raising self-efficacy and frequency to engage in PA⁶⁸. Exercise self-efficacy has been described as a statistical mediator of perception and interpretation of ability regarding the aerobic exercise experience⁷¹. Positive or negative gratification related to aerobic activities has been shown to influence choices which may lead to engagement in PA⁶⁹

- **Muscular strength:** Muscular strength is a very crucial part of fitness and wellness. This factor is responsible for optimal performance for engagement in various PA such as sitting, walking, lifting, jogging, weight-lifting to even everyday leisure activities⁷². Strength is commonly perceived as a vital aspect of health-related fitness and is defined as the maximum tension muscles can undergo within a single contraction against an applied resistance. There is also a correlation between muscular strength and muscular endurance⁷³. The term muscular strength refers to three factors which are progressively increased as muscle strength increases: frequency, intensity and length of time⁷⁴. The extent of muscle strength is closely related to the health condition of individual. Few studies had explained the impact of age and BMI on successful execution of standing long jump test, utilizing muscular strength to and gender differences in success implementation of the standing long jump test^{72,75}

Self-efficacy refers to the ability to successfully execute a particular activity or behavior as convinced by the individual. It is also an important factor impacting ability of an individual to commence and sustain the engagement of PA. One study employing Korean women have illustrated that within an 8 week fitness program, muscular fitness self-efficacy was heightened significantly after completion of the exercise fitness program⁷⁶

- **Muscular endurance:** Best levels of muscular endurance could support motor development and relates to a lower prevalence of PA. Excellent muscular endurance has to be maintained due to the fact that individuals are likely to have better posture, less back problems and tolerance for muscle fatigue than those individuals who lack muscular endurance⁷⁷. The ability of muscles to exert a sub-maximal force against resistance continuously or to

sustain muscular contraction repeatedly is characterized by long-duration activities⁷⁸

One study has postulated that muscular endurance is important in daily activities, such as walking, working and playing. All such activities involve muscular contraction and relaxation and that people who possess good muscular endurance are said to have a greater working capacity. Furthermore, these activities could increase self-efficacy to continue engaging in PA for the long-term⁷⁸. A few studies among children have suggested that lessened cardiovascular endurance and muscular fitness are associated with less PA among children and adolescents. Thus, these children and adolescents have lower self-efficacy compared with those possessing high muscular endurance^{73,77}

Muscular endurance as a health-related fitness is a relative bodily preparation which allows people to adjust themselves to their physical duties. They may accomplish those duties efficiently in higher levels of self-efficacy and without feeling unreasonably tired and moreover to retain a surplus of energy for their leisure time. In regular fitness exercises, the muscles will be strengthened and endurance will increase, resulting in the improvement of bodily balance and reaction time. Creating and maintaining good levels of physical fitness subscales such as muscular endurance, good physical form and flexibility help human health by reducing the risks of, psychological problems. Based on the above, the muscular endurance could have positive effect on PA self-efficacy

- **Flexibility:** Flexibility is one of the most essential types of PA for health-related fitness in adolescents. Flexibility is helpful for all exercises that involve bending, lunging, twisting, reaching and stretching⁷⁹. Individuals require flexibility to effectively function throughout their everyday lives

Bodybuilders, who have developed bulged muscles through improper weight-training, tend to sacrifice flexibility in order to develop muscle strength. In strength training, it is important to ensure that all movements are executed through their full range of motion to satisfy the good thumb rule⁷⁴. Flexibility could also increase the self-efficacy and encourage adolescent females to join in training courses

The main aspects of flexibility are related to physical characteristics of skeletal muscle, tendons and fibrous tissue as well as neuromuscular activation of related muscle groups. Flexibility of children remains the same from the ages of 5-8 years old. The apex of flexibility

decline is from 12-13 years old children with greater decrease with the advance of age. One study has postulated that flexibility values in females are higher than that of males with hearing disabilities within primary school children. This may be due to the fact that muscles elongate accordingly during pre-adolescence in response to increased bone length and decrease in flexibility during the period of rapid development⁷³

There is some evidence of the association between flexibility and psychological well being. A study has demonstrated that the flexibility of adolescents of both genders who participated in exercise after school were better than those of adolescents who did not. Furthermore, more active school-age adolescents have better flexibility than their less active counterparts⁸⁰. Individuals who have lower levels of self-efficacy tend to become stressed by increasing concerns and they actually make it more difficult. It is important for individuals to be solution-oriented and successful and to adapt quickly to the changes. Flexibility and self-efficacy levels bring these features together⁸¹. Studies have found that a significant positive correlation exists between the flexibility of students and self-efficacy. The person who expresses that better flexibly considers himself more competent than the others that aren't in higher flexibly. People who are engaged in physical flexibility activities have a better feeling about their body which is increase self-efficacy

Study shows that as the number of psychological illnesses increase, so too does the lower self-efficacy. Thus, it becomes important to identify the factors affecting them in terms of both prevention and treatment^{77,79,82}. Sports and the resulted physical fitness flexibility have recently been emphasized as effective, inexpensive and accessible tools used in preventing and curing lack of self-efficacy

- **Psychology domain:** The psychology domain encompasses the self-efficacy component as stemming from the social cognitive theory (SCT). Self-efficacy may be one of the most proximal cognitive predictors of behavior, especially for behaviors relating to PA. It is represented by one's self-belief that he or she can effectively execute a behavior or action to achieve his or her goal⁸³. The effort spent on such goals depends on the degree of persistence in the face of failure⁶. An emerging notion denotes that the mediating effect of self-efficacy for a particular behavior may be direct or indirect. Self-efficacy has a direct influence for the undertaking of

activities. Self-efficacy is the primary concept within SCT for altering behavior, having been shown as the most significant correlate and predictor of PA among adolescents and especially children³¹. This factor is also impacted by vicarious, or 'second-hand' experience. In other words, it comprises experience which is a less strong source of efficacy, involving the observation of others to effectively execute particular behaviors while avoiding adverse consequences. At the crux, individuals convince themselves of the fact that if others are able to execute a certain behavior, they too would be able to execute that same behavior. The outcome that barrier self-efficacy plays an important role as a predictor of PA is further corroborated by its core position in SCT. By way of an example, out of six social cognitive variables, barrier self-efficacy was among the highest predictors of PA within Arab American middle school children¹⁵. Previous work has also identified self-efficacy as a core component of Bandura's SCT as the vital personal determinant of adolescent PA attitude⁸⁴. On the other hand, Van der Horst *et al.*⁵³ summarized the various categories of self-efficacy, which were barriers efficacy, asking efficacy, environmental change efficacy and PA efficacy. The wide variety of these self-efficacy categories suggested that does not exist a unified consensus as to the constructs of self-efficacy, especially within PA research

THEORETICAL MODEL

The current model was designed based on the relevant factors found from the literature survey and interview with teachers and coaches for adolescents with hearing impairments. The interview was conducted using a qualitative approach to determine the key factors and micro factors that could have an effect on the self-efficacy to enhance the physical activity level for adolescent girls with hearing impairments in the Iraqi schools. From the review the literature, it can be noted that the majority of factors determined were within sports psychology, within which these factors could enhance the level of physical activity for adolescent girls.

Therefore, the selected factors should be taken into consideration for schools comprising ample adolescents; a number of these factors relate to social domain, especially regarding parental support, parental role modeling and peer influence. Four other factors related to environmental domain include: access to service, equipment to access, place for

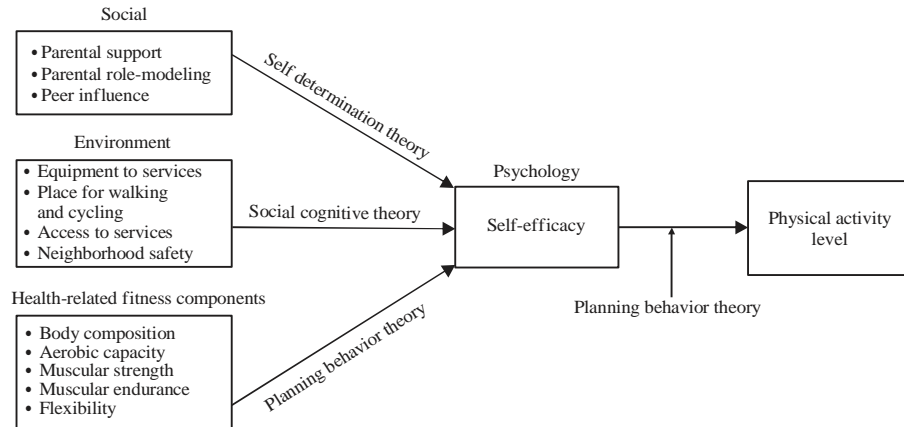


Fig. 4: Theoretical model

walking and cycling and neighborhood safety. Additionally, physical fitness domains must be considered, which are: Body composition, aerobic capacity, muscular strength, muscular endurance and flexibility. These fitness domains are main components in enhancing the self-efficacy among participants. The psychology domain, in terms of self-efficacy, must be considered to increase the physical activity level. Three theories were established to combine the relationships between the domains as suggested by Meri *et al.*⁸⁵. The self-determination theory for social domain to support the relationship with self-efficacy. Social cognitive theory to support environmental domain relationship with self-efficacy. Finally planning behavior theory to support the health-related fitness with self-efficacy to physical activity.

The proposed domains can be seen relevant to the context of physical activity as a result of literature survey. In Fig. 4. The theoretical understanding of social cognitive, planning behavior and self-determination theory led the researcher to establish the association relationships among these domains. The present study proposes to assist in the examination of the primary impacting factors on adolescent girls with hearing impairments to improve their physical activity level in the Iraqi schools. This study was encouraged by an actual need to examine the demands, difficulties and challenges for the adolescent girls with hearing impairments in their physical activity. The proposed domains and factors could be observed related to the context of this particular study, since it was all supported through the prior literature. The design of the study model had been established by three well-known theories. The relationship of domains and the combination among the factors had previously been supported by three theories: theory of planning behavior (TPB), social cognitive theory (SCT) and self-determination theory (SDT).

CONCLUSION AND FUTURE WORK

The findings of this study indicated to investigate the success factors for physical activity among hearing impairments adolescents girls. The study found that limited research for physical activity among hearing impairments especially adolescent girls. Therefore, by highlighted success factors a model was designed in order to fulfill the modeling gaps in the literature. The investigated factors categorize to four dimensions social support, environmental, health-related fitness and psychology. The study found the social support factors in terms of (parental support, parental role modeling and peer influence) based on self-determination theory and environmental factors in terms of (access to services, neighborhood safety, equipment to services and place walking and cycling) based on social cognitive theory have an effect on self-efficacy of physical activity. In additional, health-related fitness in terms of (body composition, aerobic capacity, flexibility, muscular strength and endurance) based on planning behavior theory have an effect of on self-efficacy of physical activity. Finally, based on planning behavior theory the psychology regarding self-efficacy have a strong effect of increasing the physical activity level for hearing impairments adolescent's girls. The study is a part of Ph.D. research, whereby a proposed model will be validated in an upcoming research paper that will employ a quantitative research method and develop a questionnaire instrument to collect the adolescent girls with hearing impairments feedback about the proposed factors. Finally, the collecting data will be analyzed to verify the final model.

SIGNIFICANCE STATEMENT

A review finding provides theoretical understanding for the success factors to overcome the difficulties and

challenges of physical activity faced hearing impairments adolescents' girls, especially in Iraq society. The results showed that insufficient research in this term. Therefore, these results could help the decision makers to change the lifestyle for hearing impairments adolescents' girls to be more active and effective. Additionally, by highlighted the success factors, the decision makers could be able to measure the physical activity level and highlighted the weakness and support needed for adolescent hearing impairment girls in Iraqi society.

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