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Exploring basic psychological needs within and across domains of physical activity

Birgitte Westerskov Dalgas , Karsten Elmoose-Østerlund  and Thomas Viskum Gjelstrup Bredahl 

Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark

ABSTRACT

Purpose: This study explored variations in adults' experience of satisfaction, unfulfilment and frustration of basic psychological needs within and across four domains of physical activity: Transport, household, occupation, and recreation.

Methods: We utilized a qualitative approach, conducting semi-structured interviews with a diverse group of 42 Danish adults. The participants ranged in age from 16 to 79 years (mean age 49 years, SD 21 years), gender (45% men, 55% women), and physical activity levels (38% low, 33% average, 29% high). Data were analysed using a thematic analysis, applying Self-Determination Theory as the guiding framework.

Results: In the Transport domain, while most activities were seen as utilitarian necessities, autonomy satisfaction emerged for some through control over their means of transport. In Household domain, tasks were generally viewed as obligatory; however, activities with personal significance led to autonomy satisfaction and skill development. Occupation-wise, physical activity satisfaction varied, with the nature of the job impacting feelings of autonomy and competence. For Recreation domain, personal choice dictated autonomy satisfaction, with competence and relatedness varying according to goal achievement and social interactions.

Conclusion: The variations in the findings across domains indicate the effectiveness of applying strategies tailored to specific domains for enhancing need satisfaction.

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Lifestyle contexts; qualitative research; motivation; self-determination theory; contextual variations


A considerable number of people fail to achieve the recommended physical activity guidelines (Guthold et al., 2018; Sallis et al., 2016), despite the evident individual and societal burden of physical inactivity (Duijvestijn et al., 2023; Jayasinghe et al., 2021) and the proven benefits of physical activity (Warburton & Bredin, 2017). Thus, it is crucial to understand what drives physical activity.

Physical activity can be practised in a multitude of ways, reflecting diverse contexts and situations that individuals encounter daily. A systematic approach to understanding this diversity is encapsulated in the concept of "domains" (Bauman et al., 2012; Chu et al., 2015; MacNiven et al., 2012; Sallis et al., 2006). Herein, physical activity is categorized into four distinct domains, recreation, transport, occupation, and household, each representing unique contexts of individuals' everyday lives. The "recreation" domain captures voluntary activities undertaken during leisure time, such as jogging or organized sports. The "transport" domain involves movement between locations, whether walking to the supermarket or cycling to work. The "occupation" domain focuses on professional activities and school, such as physically demanding labour in construction and physical education in school. Lastly, the

"household" domain centres on domestic chores and tasks, like gardening or vacuuming. Each of the domains of physical activity, in their unique way, significantly contributes to and plays a vital role in shaping an individual's overall physical activity engagement, thus highlighting potential intervention points to promote physical activity (Bauman et al., 2012; Chu et al., 2015; MacNiven et al., 2012).

Motivation serves as a key driver for initiating and maintaining physical activity within various domains (Bauman et al., 2012; Roberts & Treasure, 2012). One prosperous perspective on motivation is provided by the Self-Determination Theory (SDT), which has proven particularly effective for understanding motivation and behaviour within physical activity contexts (Ryan & Deci, 2017; Standage et al., 2012; Teixeira et al., 2012). Central to SDT are the concepts of autonomous and controlled motivation. Autonomous motivation is derived from an individual's inherent interests and values, characterized by a sense of authenticity and personal endorsement of actions. This form of motivation encompasses two key aspects: intrinsic motivation, where activities are pursued for the inherent satisfaction and pleasure they provide, and internalized extrinsic motivation, which involves

CONTACT Birgitte Westerskov Dalgas  bwpedersen@health.sdu.dk  Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Campusvej 55, Odense 5230, Denmark

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engagement in activities that, while initially extrinsic, align with one's personal values, such as exercising for health in line with a value of well-being (Ryan & Deci, 2017). Contrarily, controlled motivation arises from external pressures and contingencies, such as rewards, punishments, or internalized feelings of obligation or guilt (Ryan & Deci, 2017). In the context of physical activity, autonomous motivation is closely associated with positive outcomes such as sustained engagement in physical activities, resilience, adaptive behavioural patterns, increased vitality, and overall well-being (Ng et al., 2012; Rouse et al., 2011; Teixeira et al., 2012). Intrinsic motivation is particularly significant for physical activity participation, as it is the only form of motivation that has been directly linked to objectively measured levels of physical activity (Kalajas-Tilga et al., 2020). Conversely, controlled motivation is linked to adverse effects, such as maladaptive behaviours, diminished satisfaction with life, lowered self-esteem, and increased susceptibility to depressive symptoms (Ng et al., 2012; Rouse et al., 2011). SDT posits that an individual's type of motivation (autonomous or controlled) is influenced by the perceived satisfaction or frustration of three basic psychological needs: Autonomy, competence, and relatedness. The need for autonomy refers to the desire for self-direction and ownership of one's actions. Competence entails the need to be effective in one's endeavours and to have opportunities for skill and capability enhancement. Relatedness is the need to feel connected and accepted by others (Ryan & Deci, 2017). Environments that support an individual's psychological needs tend to promote experiences of need satisfaction, which in turn are likely to foster autonomous motivation. Conversely, environments that thwart these psychological needs often lead to a perception of need frustration, which is likely to result in controlled motivation or even amotivation (Ryan & Deci, 2017). In addition to need satisfaction and need frustration recent studies have introduced a third need state, termed need unfulfilment (Bhavsar et al., 2020; Reeve et al., 2023). This state exists in a liminal space between need satisfaction and frustration, characterized by a sense of the psychological needs being overlooked or set aside (Huyghebaert-Zouaghi et al., 2021; Ntoumanis, 2023). While need unfulfilment is not as detrimental as need frustration, it nonetheless has been linked to suboptimal functioning and outcomes that are less conducive to fostering autonomous motivation and well-being (Ntoumanis, 2023; Reeve et al., 2023).

Several studies have investigated the relationship between basic psychological need satisfaction and physical activity behaviour in specific domains of physical activity, such as the recreation domain (Craike, 2008; Gerber et al., 2018; Kang et al., 2020; Lloyd & Little, 2010; Lochbaum & Jean-Noel, 2016; Wang,

2017), the occupation domain (Cid et al., 2019; Lochbaum & Jean-Noel, 2016; Ntoumanis & Standage, 2009; Pedersen et al., 2018, 2019; Salazar-Ayala & Gastélum-Cuadras, 2020; Standage et al., 2003; Thomas et al., 2021), and the transportation domain (Burgueño et al., 2020). Qualitative research into basic psychological needs in recreational physical activity reveals several factors influencing these needs. Autonomy, a critical need, is shaped by external elements like weather conditions (Huang et al., 2023), personal commitments (Raabe & Readdy, 2016), and coaching styles (Beddoe et al., 2023). It is also affected by internal factors, notably health conditions (Huang et al., 2023). The need for competence is similarly influenced: physical constraints and health issues can limit this sense of competence (Huang et al., 2023), and the satisfaction of competence in one activity doesn't necessarily extend to others, as it is highly context-specific (Raabe & Readdy, 2016). Additionally, peer feedback plays a positive role in enhancing competence in physical activities (Beddoe et al., 2023). The need for relatedness in recreational physical activities is significantly impacted by the level of support from family and friends (Beddoe et al., 2023; Huang et al., 2023) and the feeling of belonging to a team (Raabe & Readdy, 2016). Qualitative studies investigating basic psychological needs in occupational physical activity have primarily focused on the physical education context. These studies have generally emphasized the importance of creating a PE environment that nurtures students' autonomy, competence, and relatedness, thereby enhancing their overall motivation and engagement (White et al., 2021). In enhancing autonomy within PE, offering students a variety of activity choices and incorporating novel tasks are effective strategies (Abildsnes et al., 2017). To foster competence, Aniszewski et al. (2019) suggest tailoring activities to different skill levels and providing constructive feedback. For relatedness, positive peer relationships can be encouraged through teamwork and a community-focused class environment (Mitchell et al., 2015). Additionally, teacher-student interactions that demonstrate personal interest and understanding (Sparks et al., 2015), significantly enhance relatedness. Qualitative basic psychological need research in household or transportation physical activities on these needs is limited.

This body of work offers a solid foundation for understanding how the fulfilment of basic psychological needs can significantly influence physical activity behaviour in these domains. However, to our knowledge, no studies have, to this date, explored the basic psychological needs in the household domain of physical activity. Further, the knowledge in the current literature is largely domain-specific, with limited exploration into the differences between them. By

not exploring these findings across different domains, we miss the opportunity to understand how the dynamics of basic psychological needs and physical activity behaviour may differ from one context to another. Therefore, the next step in this line of inquiry is a research approach that concurrently examines both within-domain variations and across-domain differences in the expressions of basic psychological needs. By doing so, it will be possible to explore the specific and general aspects of how the environment influences fulfilment of the basic psychological needs within and across various physical activity contexts. This dual focus could lead to the development of interventions that are not only sensitive to the unique characteristics of each domain but also adaptable to the broad spectrum of physical activity contexts.

A study by Sheldon and Niemiec (2006) calls for adopting a broader perspective, suggesting that individual well-being does not just depend on the perceived satisfaction of basic psychological needs within a single life domain. Instead, their findings underscore the importance of achieving a balanced perceived need satisfaction across all life domains, emphasizing that each domain is important for obtaining overall well-being (Sheldon & Niemiec, 2006). In the context of physical activity, understanding the balanced perceived satisfaction of autonomy, competence, and relatedness across various domains is vital. This approach offers a deep insight into what motivates individuals to engage in physical activity, which not only has the potential to enrich our theoretical understanding but also bears practical implications by informing the design of more holistic, effective interventions that account for variations in individuals' experiences across all domains of physical activity.

The current study

Building upon the foundation of Self-determination theory, this study *aims* to explore Danish adults' experience of satisfaction, unfulfilment and frustration of basic psychological needs within and across four domains of physical activity, including transport, household, occupation, and recreation. Specifically, the focus is on variations in satisfaction, unfulfilment and frustration of basic psychological needs within and across four domains of physical activity. We expect that the satisfaction, unfulfilment, and frustration of basic psychological needs will exhibit distinct variations both within and across the four domains of physical activity—recreation, transport, occupation, and household. We believe insights on these variations can generate a rich understanding of individuals' physical activity behaviour, recognizing the diverse contexts in which these behaviours occur. The insights generated might be instrumental in designing interventions that are tailored to specific aspects of adult life.

We have selected qualitative methods to explore the individuals' experiences of psychological need satisfaction, unfulfilment and frustration within and across domains of physical activity. This approach is essential for capturing in-depth insights into individual experiences and perceptions, a necessity in the realm of physical activity (Smith & Sparkes, 2016). Our decision is supported by prior research, which indicates that narratives about satisfying or unsatisfying experiences are often rich in details pertaining to basic psychological needs (Jang et al., 2009; Sheldon et al., 2001). To gather data, we have utilized semi-structured interviews (Brinkmann & Kvale, 2014). This method is chosen for its effectiveness in eliciting detailed and nuanced accounts, crucial for exploring the interplay between environmental factors, psychological needs, and physical activity behaviour. For the analysis of this data, we employ framework analysis (Braun & Clarke, 2021; Ritchie & Spencer, 1994), a methodology renowned for its systematic yet flexible approach. This technique allows for a comprehensive examination of themes and patterns in the data, facilitating a deeper understanding of the psychological mechanisms influencing physical activity behaviour across various life domains. By integrating qualitative interviews with framework analysis, we aim to gain substantial insights into the motivational factors underlying physical activity behaviour. This knowledge is pivotal in designing domain-specific interventions to enhance physical activity, addressing individual needs within these diverse contexts effectively. Our study, therefore, seeks to contribute meaningfully to the literature on physical activity, motivation, and psychological needs.

Methods

Participants

The sample was drawn from a national Danish survey study with 163,133 respondents. Within this group 48,488 respondents indicated their willingness to be considered for this subsequent interview study. From this pool, we recruited 42 Danish adults to participate in the interview study. The participants were sampled using a purposeful maximum variation sampling method (Gray, 2004) to be able to explore diverse viewpoints and experiences (Patton, 2002; Schreier, 2018). The sampling was based on a maximum variation in the participants' physical activity frequency level, gender, and age. Participants were classified according to their gender, with categories including men and women. In terms of age, they were grouped into three distinct age brackets: 15–29 years, 30–64 years, and those aged 65 and above. The details regarding participants' gender and age were sourced from a national database. Physical activity frequency levels, defined as the number of times participants

engage in physical activities per week, were calculated from the participant's answers in the survey. These were calculated across the four domains of physical activity, recreation, occupation, household, and transport and then categorized as low, average, and high relative to the responses from all participants in the survey data. To enhance the diversity and representativeness of our participant pool, we carefully selected individuals from a wide range of municipalities across Denmark. These municipalities were varied not only in their geographical locations but also in the average socio-economic status of their residents. This approach ensured a comprehensive geographical distribution and a diverse socio-economic representation in our study. This strategy was instrumental in providing insights into the diverse experiences and practices of physical activity among Danish adults. Exclusion criteria for the interview study included individuals who did not provide consent to be contacted regarding an interview study and those with medical conditions that severely limited their ability to engage in physical activity. Additionally, those who did not complete the initial survey or had missing data in relevant fields were excluded from the selection process.

The first author extended email invitations to 436 potential participants, highlighting their previous participation in the survey as the basis for the invite. The email elucidated the study's focus on examining motivation for physical activity. The email also identified the first author as the person who would conduct the interviews. Out of the emails sent, we received 58 affirmative responses indicating willingness to participate in the study. We conducted interviews iteratively, with a keen focus on achieving both within-group and across-group diversity based on our predefined categories of physical activity frequency, gender, and age. Upon completing interviews with 42 participants, we determined that data saturation had been reached, signifying that additional interviews were unlikely to yield new or unique insights. At this juncture, despite having more interested participants, we made the decision to conclude the data collection process. This approach was taken to ensure that the study's findings were not only robust and comprehensive but also achieved in an efficient manner, both in terms of time and resources, both for the authors and the potential participants.

In the interview study involving 42 participants, the age distribution was as follows: 36% were between 15 and 29 years old, 31% were aged 30 to 64, and 33% were 65 or older. Regarding gender, 45% of the participants were men, and 55% were women. In terms of physical activity frequency, 38% of the participants engaged at low levels, 33% had an average frequency, and 29% participated at a high level. For a more detailed breakdown of the sample characteristics, please refer to [Appendix 1](#).

Data generation

We chose a semi-structured interview design to develop detailed and rich insights (Brinkmann & Kvale, 2014). The interview guide was structured to gather detailed insights into participants' physical activity habits and related perceived need satisfaction and frustration. The interview guide was piloted before use. The interview began with introductions from the researcher and demographic questions. Subsequently, participants were asked about their physical activity habits, associated influences on their psychological needs and specific experiences within recreation, transport, occupation, and household domains of physical activity during their lives. [Table 1](#) shows the main interview questions targeting the psychological needs of autonomy, competence, and relatedness across the four domains of physical activity. For the full interview guide, refer to [Appendix 2](#).

[Table 1](#) outlines interview questions assessing autonomy, competence, and relatedness across four domains: Transport, Occupation, Household, and Recreation, to understand motivation behind activities.

Each participant was interviewed individually one time by the first author. She conducted most of the interviews face-to-face in participants' homes. However, there were a few exceptions: four interviews took place online, and two were held in public locations at the request of the participants. The interview lengths ranged from 75 to 180 minutes (average: 130). The audio-recorded interviews were transcribed and anonymized with pseudonyms before uploading to NVivo. Post-interview notes, encompassing descriptive, analytical, and interpretative elements, were also added to NVivo for researcher reflexivity.

Data analysis

The first author conducted the data analysis in an ongoing and iterative manner using a codebook thematic analysis, the Framework Analysis (Braun & Clarke, 2020; Ritchie & Spencer, 1994). This method was chosen for its systematic structuring of qualitative data. It permits early theme identification while also allowing for ongoing refinements and inductive theme generation (Braun & Clarke, 2021). We implemented the Framework Method in five phases: familiarization, framework development, indexing the data, charting the data, and interpretation (Ritchie & Spencer, 1994). This approach facilitated a nuanced exploration of individual participant perspectives while maintaining an overarching view of the extensive dataset. We initiated our analysis by reviewing the transcripts and jotting down preliminary impressions and ideas. The framework for segmentation was built upon the constructs of Self-Determination Theory, specifically Autonomy, Competence, and Relatedness, considering their states

Table 1. Main interview questions that are related to basic psychological needs.

Transport	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? What did your family and friends think about you [activity]? Was it normal to [activity] where you lived?
Occupation	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? Did you feel skilled at [activity]? Did feel that you were able to develop your skills? What did your peers think about [activity]?
Household	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? Did you feel skilled at [activity]? What did your family and friends think about you [activity]? Was it normal to [activity] where you lived?
Recreation	Why did you [activity]? Whose choice was it, that you [activity]? Do you think that, doing [the activity] reflected what you wanted and who you were? Did you feel skilled at [activity]? Did feel that you were able to develop your skills? Was it normal to [activity] where you lived? Who introduced [activity] to you? What did your family and friends think about your engagement in [activity]? Did you feel that you were a part of a community?

of need satisfaction and frustration. This framework guided our categorization of the data, which we subsequently charted into a table. Each row in the table represented a Basic Psychological Need construct, while columns were aligned with different domains of physical activity (as detailed in [Appendix 3](#)). The subsequent phase of interpretation was more inductive in nature, focusing on identifying patterns and developing themes within the context of Basic Psychological Needs and domains of physical activity. The concept of need unfulfilment were generated inductively during the interpretation phase of our thematic analysis.

Ethics

The study received ethical approval from an Institutional Review Board before participant recruitment. All participants were provided with a clear explanation of the study's purpose and procedures before giving informed consent. Participants were assured of their right to withdraw from the study at any point without any negative consequences, and their anonymity was protected throughout the study. When writing about the participants and using quotes in the analysis section of this paper, we have changed or omitted potentially identifying details. To safeguard participant confidentiality, all research materials were securely stored and only accessible to the research team.

Results

In the following analysis section, we explore the interview participants' experiences of satisfaction, dissatisfaction, frustration of their basic psychological needs—autonomy, competence, and relatedness within four distinct domains of physical activity: Transport, household, occupation, and recreation.

Transport

In our analysis of the participants' experiences of psychological need satisfaction, unfulfilment and frustration of their basic psychological needs within the transport domain of physical activity we predominantly identified sentiments of need unfulfilment. The participants narratives frequently highlighted the utilitarian nature of their transportation activities. A key representation of this theme was for example found in Emil's reflections on his use of the bicycle for transportation. Emil described cycling not as an activity of enjoyment but as a necessary means for accomplishing specific tasks: "It was just necessary [...] I have not really used my bike in my spare time, only when I have had to go places. It is not like I have cycled for fun." This statement indicates a perceived absence of personal choice in his engagement with cycling as transportation. The term "necessary" where salient in participants' descriptions of active transportation, highlighting a sense of obligation. This usage indicates that active transportation was often compelled by external needs rather than internal desires or enjoyment.

While autonomy unfulfilment was prevalent, instances of autonomy satisfaction were also observed in the transportation domain, albeit less saliently. Some participants, like Frederik, experienced autonomy satisfaction through their sense of having control over personal transportation: "It is a feeling of freedom to have your own means of transportation that you control, and that can take you around the world. You can get around without being dependent on others." Frederik's emphasis on "control" and avoiding dependency on others underscores how active transportation becomes a symbol of self-reliance and autonomy. This perspective suggests that for some, managing their own transportation is an empowering experience that support their psychological need for autonomy.

The perception of autonomy within the transportation domain was found to be highly contingent on external factors, particularly weather conditions, distance, and safety. Participants often discussed how these external elements influenced their experiences in relation to their need for autonomy. Dagmar's narrative provides an example of this nuance:

It was necessary to cycle for a period because my husband was working in Odense, and he needed the car. I only perceived it that way on the days the weather was miserable because otherwise, I quite enjoyed the trip over the bridge. I prepare myself for what is going to happen and unwind from what has happened [...] I am basically very economically minded. There is no reason to drive around in a car and use a lot of gas when you can use a bike. It is not good for the environment, and it's not good for the wallet.

In this account, Dagmar initially describes cycling as a form of active transportation driven by external necessity due to her husband's use of the car. However, this perceived necessity shifts based on weather conditions. On days with unpleasant weather, Dagmar experience autonomy frustration, as her choice to cycle is influenced more by compulsion than desire. Conversely, on days with favourable weather, the same activity of cycling the exact same route takes on a different meaning for her, becoming a source of enjoyment and subsequently autonomy satisfaction. This indicates that the fulfilment of the need for autonomy is not static in the transportation domain, but dynamically influenced by external conditions.

In the transport domain, there was a notable lack of discussion around competence satisfaction, unfulfilment and frustration. This might be due to the participants experience of physical activity in the transport domain being an utilitarian necessity. However, an exception to this pattern were identified in the narrative of Frederik, who articulated a unique sense of mastery in navigating the urban environment on his bicycle, indication an experience of competence satisfaction: "I enjoy cycling quickly in the middle of a big city, finding a gap between cars. It is a good way to move for me. [...] there is an element of sport in it. Finding a gap." In this expression, Frederik portrays cycling not just as a means of transportation but as an active engagement in a challenging and dynamic environment. The enjoyment he derives from swiftly manoeuvring through city traffic and identifying gaps between cars illustrates his perception of cycling as a skilful activity that extends beyond its functional purpose.

Transport activities like walking or cycling were generally framed as a solitary activity by participants. A representative example is Ole's statement, "I always cycle on my own. It is like... It is just about getting

from A to B." This expression reflects the utilitarian view of cycling, focused solely on the functional aspect of commuting rather than the potential for social interaction. This reoccurring narrative of solitary transport activities may lack of opportunities for social connection and engagement, which are integral to satisfying the need for relatedness.

However, a contrasting perspective were identified in the narratives from younger participants, particularly those commuting to educational institutions. These participants often mentioned cycling with peers, highlighting a more social aspect of transport activities. For example, Anne's statement, "Often I'm accompanied by some friends. We cycle together. It's nice when you cycle together. I like that there is someone to talk to," illustrates a different experience within the transport domain. Her narrative highlights the enjoyment and social connection derived from cycling with others, contrasting with the solitary experiences described by other participants. This indicates that while the transport domain may generally be associated with relatedness unfulfilment, there are transportation contexts, particularly among younger individuals, where social connections are established and maintained, contributing to relatedness satisfaction.

Household

In our analysis of the participants' experiences of psychological need satisfaction, unfulfilment and frustration of their basic psychological needs within the household domain of physical activity we predominantly identified sentiments of need unfulfilment. However, it also presents opportunities for need satisfaction under certain conditions.

Our analysis in the household domain prominently highlights autonomy unfulfilment among participants, with many viewing household chores as obligatory and necessary for maintaining a functional home. Marie-Louise's statement encapsulates this sentiment:

In general, I believe household work is necessary, particularly the practical tasks that need to be done, such as cleaning. Although these tasks do not please me, they are necessities that have to be done, like washing clothes or having a clean bathroom.

Her narrative, emphasizing the inevitability of these chores ("have to be done") and their lack of personal satisfaction, reflects an experience of autonomy unfulfilment. This pattern of perceiving household tasks as externally imposed responsibilities, driven more by obligation than by personal choice or value, was a recurrent theme among participants, indicating a widespread experience of autonomy unfulfilment in this domain.

Yet, there are instances where these tasks are imbued with personal meaning and emotional value, transforming them into autonomy satisfying activities. An example of this comes from Julie, who finds personal satisfaction and meaning in household chores. She noted,

I really like vacuuming. I mean, I really enjoy it. I really like it. [...] There is nothing better than sucking up a sandal full of sand from the daycare. It is completely therapeutic to vacuum. [...] I like doing laundry, especially when it is finished, and you pack it away. It is really nice. However, yes, I like it. I like that feeling of being able to check it off the list. You have done it. It is such a nice, relaxing feeling. Now, it is out of the way. It is done.

Her perspective diverges notably from the predominantly utilitarian view of household chores. Unlike Marie-Louise, who performs tasks out of necessity, Julie approaches the same chores with a sense of enjoyment and personal investment. She describes vacuuming as “therapeutic” and finds pleasure in completing laundry. Her enjoyment goes beyond the physical act; it’s tied to the feeling of accomplishment and the mental well-being she derives from these activities.

In the household domain, discussions on competence satisfaction, unfulfilment, and frustration was scarce. However, a few participants did break this pattern, particularly in their narratives about cooking, gardening, and home repairs. These activities offered some participants a chance to develop and demonstrate skills, hinting at moments of competence satisfaction within an otherwise necessity-driven domain. For example, Niels described his enjoyment of learning and mastering new tasks in the context of home repairs. He said: “I enjoy figuring out how to do things correctly. For example, when we had water damage, I did most of the repairs myself, learning from a carpenter.” This narrative reflects a clear strive for mastery, where Niels seeks not only to complete the task but to do so with a level of proficiency and correctness. His proactive approach to learning from a carpenter and applying these new skills in a practical context illustrates a deep engagement with the task, transforming a routine household chore into an opportunity for personal development and skill acquisition.

Relatedness satisfaction was salient within the household domain. It was prominently highlighted through instances where participants engage in joint activities, fostering a sense of community, cooperation, and emotional connection. This satisfaction stems not just from the act of performing tasks together but from the shared experiences and the emotional bonds that these activities cultivate. Karen’s experience in the garden with her husband exemplifies this:

It is nice to go out and do something together. My husband has always been the driving force in the kitchen garden and such, but I have also grown up

with the experience of being able to produce. It occupies a significant part of our lives.

This narrative reflects the joy and contentment derived from engaging in a shared task. The garden becomes a space where both Karen and her husband contribute, not just in a physical sense, but also emotionally, by investing time and effort together. This mutual engagement goes beyond the mere act of gardening; it’s about creating and sharing a meaningful experience that strengthens their bond and provides a sense of belonging. Similarly, Alberte’s experiences of cooking for family and friends highlight the emotional aspect of relatedness satisfaction. Her statement, “Preparing food for others brings me immense joy. Gathering family and friends around a good meal is something I cherish,” encapsulates the essence of relatedness through acts of care and affection. The act of preparing a meal becomes an opportunity to express love and care and sharing it with loved ones creates a sense of community and emotional intimacy. On the contrary, some participants, especially among the women who were mothers, experienced a lack of cooperation and social support, particularly when the burden of tasks fell predominantly on one person. Linda’s account captures this sentiment of relatedness frustration quite poignantly. She said,

Most of the [housework] was just something that had to be done. My husband was really good at starting a lot of things. Throwing many balls into the air, but who was supposed to catch them? It was me. It has been exhausting. For many years, I’ve had a knot in my stomach.

This quote underscores the emotional strain and feelings of isolation that can arise when one feels unsupported or alone in managing household responsibilities. Such experiences can lead to perceived relatedness frustration within the household domain. The inclusion of such sentiments among women who were mothers indicates some gendered dynamics and challenges that can affect experiences of relatedness in household activities.

Occupation

In the occupational domain of physical activity, our we identified varied experiences satisfaction, unfulfilment, and frustration of basic psychological needs among participants, especially in relation to the need for autonomy. This variety was mainly contingent on the nature of the participants job, and whether it imposes constraints or offers alignment with personal interests. In some of the participants narratives, we identified autonomy frustration. Niels’ experience in the military exemplified this experience. Required to engage in physical activities that did not align with his interests, he described these duties as a forced experience: “At that time, I was not interested

in the activity, so it was just something to get through. It felt forced, and I had to find my way to make it work." This statement highlights the conflict between externally imposed job demands and personal preferences, leading to a sense of being constrained by the requirements of his role. In other participants narratives we identified autonomy unfulfilment. Rikke, for example working in a sedentary role, experienced autonomy unfulfilment, contrasting starkly with her previous more active job. Her current position required her to remain mostly sedentary, which she found unsatisfying: "When I was in home care, I used to cycle and move up and down stairs and be active, and I can really feel the difference now that I just sit." The phrase "I sit and sit and sit" emphasizes the monotony of her work environment and her longing for more physical engagement, indicating a mismatch between her job's nature and her personal need for physical activity during the workday. Conversely, other participants experienced autonomy satisfaction. Anders' experience as a farmer reflects the sentiments of participants who found autonomy satisfaction in roles that offer task variety and align with their personal interests. His focus on diverse tasks rather than the physicality of the work represents a segment of participants who derive autonomy satisfaction from engaging in work that resonates with their preferences and interests: "I appreciated working on various tasks, such as organizing or creating new things."

The participants discussion of experiences of competence satisfaction, frustration, and unfulfilment were sparse. Yet, instances where participants expressed competence satisfaction were identified, especially among participants with professional that provided opportunities for skill development and mastery. A clear example is found in Anders' narrative about working as a farmer: Anders articulated, "It allows me to learn various skills, and I find it fascinating." This statement reflects his engagement in a continual learning process and skill acquisition, going beyond the basic requirements of his job. His expression "I find it fascinating" underscores his intrinsic interest in the learning process, indicating a deep sense of competence satisfaction. Anders' experience exemplifies a strive for mastery. Rather than only fulfilling his occupational duties, he actively seeks opportunities to develop and enhance his skills, illustrating a proactive approach to professional and personal growth within his role.

In the occupational domain, the expressions related to the need for relatedness among participants were somewhat limited. However, a distinct theme that were identified was the sense of social support in the workplace, contributing to relatedness satisfaction. Camilla's experience at the gym serves as a prime example of this phenomenon. Camilla articulated,

I have great friendships with the instructors and other people at the gym. We help each other out, and it is nice to be noticed and acknowledged. I really appreciate that we support and assist each other in our training.

Camilla described the importance of social support in their work environment. In her account, the underlying sense of care and affection among her colleagues is evident. By assisting and supporting each other in their training, Camilla and her colleagues demonstrated a sense of mutual concern, which contributed to their relatedness satisfaction and overall well-being in the workplace.

Recreation

In the analysis of psychological need experiences in the recreation domain, all need states were identified for each need. While some experienced autonomy unfulfilment, viewing physical activities as obligatory tasks for health maintenance, others found autonomy satisfaction through activities aligning with personal values and offering mental benefits. Competence experiences varied from satisfaction in achieving personal goals to frustration and unfulfilment due to physical limitations or unmet expectations. Relatedness also varied, with some participants enjoying strong social connections and communal activities, while others encountered unfulfilment or frustration when expected social engagement was not realized.

In our analysis of participants' autonomy unfulfilment experiences within the context of physical activity in the recreation domain, a salient theme was generated across the many of the participants around the perception of physical activity as a necessity, particularly with an emphasis on health maintenance. This perspective was notably illustrated in Charlotte's remarks about running:

It's not about the run itself. It just needs to be done, just like cleaning. It's the accomplishment that matters. Some calories... And I know that when my heart starts pumping, I am keeping my blood pressure healthy. Preventing. I'm not young anymore, so I have to think about these things.

Charlotte's narrative highlights a sense of duty towards physical activity, likening it to a necessary chore like cleaning. Her focus on the outcome ("the accomplishment that matters") rather than the activity itself signals that her engagement in running is driven more by a sense of obligation to maintain health than by intrinsic enjoyment or desire. The phrase "it just needs to be done" underscores this sense of obligation, portraying running as an essential, albeit not particularly enjoyable, task for health maintenance. Her reflection that the activity is not about enjoyment

but about achieving health-related goals (“keeping my blood pressure healthy”) further emphasizes the utilitarian aspect of her physical activity. This viewpoint signifies a form of autonomy unfulfilment, where the activity, while recognized as beneficial, is not aligned with personal enjoyment or volition but is instead perceived as a boring compulsory measure for health preservation. Charlotte’s experience represents a broader trend among participants who engage in physical activity more out of necessity or health concerns than from a place of intrinsic motivation or personal satisfaction.

Many participants also experienced autonomy frustration, feeling compelled to engage in physical activities not out of personal desire or enjoyment, but due to external interpersonal pressures or adverse conditions in the physical environment. This theme of being coerced into physical activity, rather than willingly participating, was recurrent in their narratives. Per’s narrative is an example of this. He expressed a strong aversion to running, not because of the activity itself, but due to the circumstances under which he participates:

I hate running, to be honest, and I don’t know if it has something to do with when I run it’s because I have been pressured to participate in DHL again and I haven’t managed to train and my lungs, they just lag, three miles behind, you know. There’s nothing fun about it.

Per’s mention of being “pressured” and the physical discomfort he experiences (“lungs lagging behind”) highlights how the activity becomes an unpleasant obligation rather than a choice, leading to a negative experience of autonomy frustration. Similarly, Mona’s experience reflects another dimension of autonomy frustration, where factors in the physical environment play a crucial role: “In the summer, I just run here in the woods, but in the winter, it’s SO dark out here. Then I stop.” Her cessation of running during winter due to darkness illustrates how external conditions can thwart one’s desire or ability to engage in a chosen activity, leading to autonomy frustration.

However, many of the participants also did experience autonomy satisfaction in the recreation domain. Their stories were generally characterized by voluntary participation, choice, and alignment with personal values. Lars’ experience encapsulates this sense of autonomy satisfaction. He describes running as an activity that enriches his life both physically and mentally:

Running is something I found not only adds a physical aspect to your life, but it also gives you mental energy. You can feel the difference. If you have had a bad day at work, just run a lap. It can also just be a walk. Something happens.

This sense of control and personal benefit from his chosen activity illustrates autonomy satisfaction.

Moreover, Lars points out the flexibility in his approach, switching between running and walking as needed, further underlining his sense of choice in his engagement in physical activity.

In the recreation domain, participants’ experiences with competence in physical activities varied, encompassing both competence satisfaction, frustration, and unfulfilment. Instances of competence satisfaction were evident in narratives where participants reflected on achieving personal goals or mastering specific skills. Hanne’s experience of running around Furesø Lake exemplifies this satisfaction. Her statement, “You do not have to run 25 kilometres, but it is quite fun when you run around Furesø Lake, and I have done that many times . . . It is a fun thing to say, ‘Okay, we can actually run 25 kilometres’”, conveys a sense of pride and accomplishment in achieving a significant running distance. Similarly, Karen’s account of progressively increasing her exercise intensity, “It is also a pleasure to feel that you can handle it, especially when you can start building more . . . eventually, I can do more repetitions or add a few extra pounds here and there,” reflects her satisfaction in gradually mastering and enhancing her physical capabilities. These narratives underscore the fulfilment derived from setting and achieving personal fitness goals, embodying the essence of competence satisfaction. Competence frustration, however, where identified in accounts where participants confront limitations or declining abilities. Mona’s reflection on her decreasing speed and inability to keep up with her children, illustrates this frustration:

I do it sometimes because I feel that as I get older each year, I get slower and slower, and I think I have reached the level where I am irritatingly slow. I can no longer keep up with my children.

Her awareness of her declining physical abilities in contrast to her previous performance levels manifests as a source of frustration, highlighting the challenges of maintaining competence in the face of ageing or other limitations. Competence unfulfilment were reflected in narratives where participants feel their efforts do not yield the expected progress. Frederik’s experience with skateboarding is a case in point. Despite investing considerable time and effort, as he describes, he does not attain the level of skill he anticipated:

There was a year when there was a skateboard in the picture. I think I spent 7–8 months learning to do those fucking Ollies, but I decided that this is not what I should be doing. Moreover, it sounds like I did not train, but I trained a lot.

This scenario illustrates a state where despite significant effort, the expected level of skill acquisition or satisfaction from the activity is not achieved, leading to a sense of unfulfilment.

Participants' experiences of relatedness satisfaction in the recreation domain often involved activities that fostered community, connection, and mutual support. Anette's involvement in outdoor activities and scouting exemplifies this satisfaction. Her description of the scouting group, "Outdoor life provided freedom, practicality, and space for everyone, allowing us to weave social connections and get shared experiences," highlights how such activities fostered a strong sense of community and belonging. The involvement of a young man in a wheelchair and the group's support for him further underlines the inclusive and nurturing environment that enhanced their social connections. Mette's narrative about enjoying undisturbed connections during walks, "The joy of undisturbed connection was evident; no one had to check social media or be interrupted," reflects the value of unmediated, direct interaction in fostering deep, meaningful relationships. Similarly, Marie-Louise's return to horse riding, supported by her husband's understanding of the happiness it brings her, "But he knows how happy I become after being on a horse, so he thinks it's actually better just to send me out there," illustrates how shared understanding and support in recreational activities can enhance emotional bonds and relatedness. Relatedness unfulfilment were quite common in the narratives of those who did team sports or activities in switching groups. For example, Julie's experience in commercial fitness classes, "I started in fitness with some friends, but eventually, it was only me who showed up. So it kind of fizzled out," exemplifies the disappointment and disinterest that can ensue when the anticipated social aspect of an activity does not materialise. Her narrative conveys a sense of absence of companionship, underlining how the social component is crucial for her engagement and enjoyment in physical activities. Relatedness frustration were not salient in the participants' narratives about physical activity in the recreation domain, however we did identify it in a few participants' narratives. Mona's experience in a football club, was an example of this: "I felt ignored. You come to a big club, and it was only because it was right next to where I lived [...] And then you get there, and I felt all alone in the world." Her expectation of being welcomed and integrated into the group was met with indifference and isolation, leading to feelings of alienation and frustration. This experience highlights how the lack of social support and acknowledgement in recreational settings can significantly impede the sense of belonging and relatedness.

Discussion

The present study explored basic psychological needs satisfaction, unfulfilment, and frustration among Danish adults, specifically within the physical activity

domains: Transport, Household, Occupational, and Recreation. Grounded in Self-Determination Theory, this research sought to extend the understanding of psychological need satisfaction, unfulfilment and frustration of the basic psychological needs, autonomy, competence, and relatedness beyond a singular focus on physical activity, encompassing various life domains, including recreation, transport, occupation, and household activities.

Autonomy

Our study indicates that perceptions of physical activity—as either a necessity or a personal choice—significantly influence how individuals experience autonomy in different domains. In areas like transport, work, and household chores, physical activities are often seen as obligatory tasks rather than enjoyable pursuits. This is also true for some health-focused recreational activities, such as running for cardiovascular benefits, which participants view as essential but not particularly enjoyable. The research of Kinnafick et al. (2014) suggests that guilt can sometimes initiate physical activity, but according to Pelletier et al. (2002), such motivations are typically not sustainable for long-term engagement. Thøgersen-Ntoumani and Ntoumanis (2006) have found that the effectiveness of guilt-driven motivation varies, indicating that while activities motivated by necessity might not always encourage continued participation, they can still be beneficial. On the other hand, our findings highlight the importance of personal choice in enhancing the experience of autonomy. Participants who engaged in recreational activities out of personal interest, rather than obligation, experienced greater satisfaction in terms of autonomy. In the workplace, when the nature of the job aligns with an individual's interests in physical activity, it becomes a source of personal satisfaction and autonomy. The same principle applies in the household, where tasks chosen and carried out with personal significance or as part of a valued routine lead to a sense of autonomy. In transportation, the freedom to choose a mode of transport and finding personal value in that choice, like the independence of cycling or the relaxation of walking, also contributes to a sense of autonomy. These conclusions are supported by the work of How et al. (2013) and Ward et al. (2008), who found that providing choices in physical education significantly boosts autonomous motivation and physical activity levels. Long et al. (2014) reported similar findings in the realm of recreational activities, emphasizing the importance of offering choice. Our study broadens the understanding of the role of personal choice and alignment with individual values in enhancing the satisfaction of autonomy across various physical activity domains, including household and transport, in addition to previously studied domains such as physical education and recreation. Our research further aligns with

existing studies by Huang et al. (2023), Raabe and Readdy (2016), and Beddoe et al. (2023), highlighting the significant impact of external factors like weather, personal commitments, and coaching styles on autonomy in recreational physical activity. In the occupational domain, the nature of one's job, especially the presence of diverse and novel tasks, as also noted by Abildsnes et al. (2017), significantly influences the need for autonomy. Additionally, we found that in the transport domain, autonomy is primarily influenced by external conditions such as weather and safety concerns. In household activities, social expectations are a key determinant of autonomy.

Competence

In our exploration of competence across we find that it is influenced by across various domains of physical activity, we have identified that it is shaped by a combination of individual aspirations, external limitations, and the surrounding social context. In the Recreation Domain, the attainment of personal fitness goals and the frustrations of unmet expectations significantly shape competence experiences. This is in line with Huang et al. (2023), who emphasize the influence of physical abilities and limitations on competence. Our study reveals that tangible measures of progress, such as distance covered or time spent, play a vital role in enhancing competence, echoing Donnachie et al. (2017)'s findings about the motivational power of quantifiable achievements. Contrastingly, we found that the Transport Domain, characterized by its functional nature, presents limited opportunities for skill development, leading to a reduced focus on competence. In the Household Domain, we observe a shift in competence experiences based on the context. Obligatory chores, when transformed into shared or personally significant tasks, can become opportunities for skill development. This mirrors the existing literature's suggestion that environments conducive to skill-building can enhance the sense of competence (Myers, 1998). The Occupational Domain highlights how job nature influences competence. Roles that offer variety and skill development lead to experiences competence satisfaction, resonating with the idea that fulfilling work environments are those that provide continuous learning opportunities (Deci et al., 2017). Furthermore, our findings emphasize the crucial role of the social environment. In the Recreation Domain, for instance, supportive or competitive contexts significantly influence competence perceptions. This is supported by research emphasizing the importance of social factors in competence development, such as Aniszewski et al. (2019), who suggest that positive social dynamics, like teamwork and community-focused environments, can enhance the sense of competence.

Relatedness

Our findings in relation to the need for relatedness across various domains of physical activity suggests distinct ways in which social connections and environmental contexts influence this experience. In recreational activities, relatedness primarily stems from strong social bonds in group settings, yet unfulfilment arises when expected social interactions, particularly in team sports, do not occur. This emphasizes the need for inclusive and supportive social environments, echoing Beddoe et al. (2023) and Huang et al. (2023) who highlight the impact of support from family and friends, and Raabe and Readdy (2016) who stress the importance of team belonging. In contrast, the transport domain typically lacks social interaction, seen as a solitary endeavour, though younger participants report social aspects like cycling with friends. This suggests potential for more socially engaging transport experiences. Relatedness in the workplace is marked by the importance of social support, especially in team-based settings, underscoring the value of a collaborative workplace culture for job satisfaction and well-being. In household activities, shared tasks foster a sense of community and cooperation, indicating that joint household tasks can significantly satisfy the need for relatedness. However, unequal distribution of tasks, often affecting women, can lead to feelings of isolation and frustration, highlighting the need for equitable task sharing. Overall, our findings suggest that while the need for relatedness is universal, its fulfilment varies greatly depending on the activity domain, structured by the quality of social interactions and the nature of the activity.

Practical and theoretical implications

The findings of this study highlight both practical and theoretical implications. On the practical front, the prevalence of perceived autonomy unfulfilment identified in our study could negatively influence the motivation for being physically active in especially the active transportation, occupation, and household domains (Bhavsar et al., 2019; Huyghebaert-Zouaghi et al., 2023; Ntoumanis, 2023). Recognising that the environment within certain domains may not fulfil individuals need for autonomy allows for the development of targeted interventions that can either elevate these domains to become more supportive of basic psychological needs, thereby potentially leading to more effective outcomes (Bhavsar et al., 2019; Cheon et al., 2019).

In order to effectively address the basic psychological needs of autonomy, competence, and relatedness in the domains of Transport, Household, Occupation, and Recreation, it is crucial to adopt a domain-sensitive approach. Teixeira et al. (2020)

have provided a comprehensive guide to techniques that align with Self-Determination Theory, particularly suitable for health-related interventions. Drawing from the guide provided by Teixeira et al. (2020), the following are examples of intervention actions tailored to enhance need satisfaction in each domain of physical activity: In the Transport domain, the goal is to foster autonomy by creating opportunities for individuals to freely express their views on transportation and explore various options that resonate with their personal preferences. This involves encouraging experimentation with different modes of transport and identifying barriers to their effective use, like safety concerns or lack of route knowledge. To support competence, it's beneficial to promote self-monitoring habits that help individuals understand their transportation choices. Relatedness can be enhanced by forming community groups or forums for discussion and support, as well as initiatives like carpooling or cycling groups to foster a sense of community. Within the Household domain, autonomy is enhanced by facilitating discussions about how chores align with personal values and providing broader rationales for these tasks. Competence is supported through positive feedback on task completion and structured approaches to household chores. Relatedness is fostered by acknowledging feelings around household responsibilities and showing interest in how these tasks are managed. In the Occupational setting, fostering autonomy involves communication that encourages autonomy and avoids implying obligation or coercion. It's important to ensure clear communication of job roles and expectations to support competence, along with setting realistic and challenging goals. Relatedness is enhanced by consistent support, understanding, and active listening to understand employee concerns. For Recreation, providing a range of enjoyable activities enhances autonomy, as does encouraging individuals to try new activities. Competence can be supported by providing constructive feedback on skill development and promoting self-monitoring. Relatedness is fostered by creating safe spaces for questions and learning, as well as encouraging participation in clubs or groups. Future research could focus on adapting motivational and behavioural change techniques to specific physical activity domains, as this could significantly enhance our understanding of how to effectively modify physical activity behaviour.

Theoretically, this study enriches the Self-Determination Theory framework by emphasizing the role of perceived need indifference within the transport, occupation, and household domains. This contributes to a nuanced understanding of individuals' psychological experiences and perspectives within diverse activities and contexts. Given the unique insights this study has brought, future

research would do well to explore further the intricacies of need unfulfilment and frustration and its broader implications on motivation, well-being, and physical activity.

Limitations and strengths

This study has limitations that are important to acknowledge. One limitation is the reliance on the accounts of the participants, which may be subject to recall bias. Although research has shown that people tend to remember significant need satisfaction and frustration events (Bauer & McAdams, 2000), some participants may have had difficulty accurately recalling their experiences, leading to potential inaccuracies in their accounts. A significant limitation of our study stems from the design and scope of our interview questions. Our focus on examining differences across the four domains of physical activity meant that the questions were not designed to thoroughly explore every aspect of psychological need states within each domain. This issue was especially pronounced in our examination of the needs for competence and relatedness, where the depth of inquiry was limited. Additionally, our approach to identifying need unfulfilment was primarily inductive, meaning these aspects were not a direct focus of the interview questions. Consequently, this may have restricted the exploration and understanding of a broader spectrum of unfulfilment experiences and perceptions related to psychological needs among participants across the different domains.

Despite this limitation, this study has several notable strengths. The present study provides a rich and detailed understanding of adults' expressions of basic psychological needs satisfaction, dissatisfaction, and frustration in physical activity contexts within various domains of physical activity. Using a semi-structured interview design allowed for a flexible and adaptable approach responsive to the participants' accounts, providing detailed and rich insights into their experiences (Kvale, 2007). By using a purposeful maximum variation sampling method, a diverse range of perspectives and experiences were represented, adding to the study's strength in terms of its sample representativeness. Further, one of this study's strengths is the sample size, which is relatively large for a qualitative study due to the heterogeneous group. A larger sample size in qualitative research is necessary for robust results when the selected group is relatively heterogeneous (Guest et al., 2006). The large sample size provided a comprehensive understanding of how individuals' experiences and perspectives vary within different domains of physical activity despite the maximum variation sampling method. Furthermore, the study's use of self-determination theory as a theoretical framework for understanding

motivation and behaviour in physical activity contexts adds to its strength. Self-determination theory is a well-established and widely used theory that acknowledges the importance of supporting individuals' basic psychological needs to promote self-determined motivation and positive outcomes such as well-being (Ryan & Deci, 2017).

Conclusion

This study, grounded in Self-Determination Theory, explored the satisfaction, unfulfilment, and frustration of basic psychological needs in four physical activity domains among Danish adults. In Transport, activities were often utilitarian, lacking personal choice, but some found autonomy satisfaction through control over their transport, affected by external factors like weather. In Household, chores were generally seen as obligatory, yet some activities offered autonomy satisfaction and skill development opportunities. Relatedness in Household and Occupation was significant, with job nature influencing autonomy experiences and professional skill development contributing to competence satisfaction. In Recreation, autonomy and competence experiences varied widely, with activities chosen for health or personal values, and relatedness depended on social interaction quality. Overall, autonomy in physical activities was influenced by choice, competence by skill development opportunities, and relatedness by social environment quality. The findings of this study indicate the effectiveness of applying strategies tailored to specific domains for enhancing need satisfaction. Future research should delve into adapting motivational techniques to distinct physical activity domains for optimized behavioural change.

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Ethics approval

The study was conducted according to the guidelines of the Declaration of Helsinki. Ethical approval was granted by the Institutional Review Board of the University of Southern Denmark, Research and Innovation Organization (RIO), prior

to participant recruitment. The approval was granted on 08.11.2029 under protocol code 10.680. All individual participants included in the study provided informed consent.

Data availability statement

The data that support the findings of this study are available from the corresponding author, [BWD], upon reasonable request.

Notes on contributors

Birgitte Westerskov Dalgas, cand.scient, is a PhD student at the University of Southern Denmark. Her research centres on why persons are (not) physically active and emphasises the relationship between persons' social and environmental contexts and their development of motivation for physical activity.


Karsten Elmoose-Østerlund, PhD, is associate professor at the Centre for Sports, Health and Civil Society belonging to the Research Unit of Active Living at the University of Southern Denmark. Karsten has particularly done research into physical activity participation, social integration and the organisation of sport, particularly in sports clubs and sports organisations.

Thomas Viskum Gjelstrup Bredahl, PhD, is Associate Professor at the Department of Sport Science and Clinical Biomechanics at the University of Southern Denmark. His research focuses on motivation, behaviour change processes and health promotion among different populations. The main theoretical frameworks used in his research are the Transtheoretical Model, Self-Determination Theory, Theory of Planned Behaviour and Self-efficacy.

ORCID

Birgitte Westerskov Dalgas  <http://orcid.org/0000-0002-5434-9772>

Karsten Elmoose-Østerlund  <http://orcid.org/0000-0002-9335-5585>

Thomas Viskum Gjelstrup Bredahl  <http://orcid.org/0000-0002-4392-9763>

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Appendices

Appendix 1. Participant characteristics

Pseudo-nym	Gender	Age	Physical activity frequency level	Interview form	Interview location	Interview length (Minutes)
Alberte	Female	27	2	Face-to-face	Participants' home	118
Anders	Male	28	1	Face-to-face	Participants' work place	104
Andreas	Male	16	2	Face-to-face	Meeting room at SDU	112
Anette	Female	72	3	Face-to-face	Participants' home	162
Bjarne	Male	60	3	Face-to-face	Participants' home	167
Camilla	Female	17	3	Face-to-face	Participants' home	145
Charlotte	Male	52	2	Face-to-face	Participants' home	162
Dagmar	Female	75	2	Face-to-face	Participants' home	132
Elvira	Female	75	2	Face-to-face	Participants' home	140
Emil	Male	21	2	Face-to-face	Participants' home	89
Erik	Male	65	2	Face-to-face	Participants' home	138
Flemming	Male	51	1	Face-to-face	Participants' home	99
Frederik	Male	28	3	Online	—	138
Hanne	Female	75	1	Face-to-face	Participants' home	90
Ingemarie	Female	71	3	Face-to-face	Participants' home	142
Jens	Male	58	1	Face-to-face	Participants' home	124
Julie	Female	28	1	Online	—	81
Karen	Female	64	2	Online	—	144
Kasper	Male	34	2	Face-to-face	Participants' work place	168
Kristine	Female	31	1	Face-to-face	Participants' home	88
Lars	Male	51	3	Face-to-face	Participants' home	109
Laura	Female	17	1	Face-to-face	Participants' home	77
Lene	Female	66	1	Face-to-face	Participants' home	162
Linda	Female	60	3	Face-to-face	Participants' home	112
Lis	Female	79	2	Face-to-face	Participants' home	162
Lisbeth	Female	69	1	Face-to-face	Participants' home	94
Louise	Female	26	2	Face-to-face	Participants' home	155
Maria	Female	41	1	Face-to-face	Public park	95
Marie-Louise	Female	40	1	Face-to-face	Participants' home	170
Mathias	Male	24	2	Face-to-face	Participants' home	108
Mathilde	Female	21	1	Face-to-face	Participants' home	114
Mette	Female	30	3	Face-to-face	Participants' home	106
Mogens	Male	70	3	Face-to-face	Participants' home	151
Mona	Female	65	1	Face-to-face	Participants' home	142
Niels	Male	68	2	Face-to-face	Participants' home	11
Ole	Male	72	3	Face-to-face	Participants' home	142
Per	Male	52	1	Face-to-face	Participants' home	149
Poul	Male	79	2	Face-to-face	Participants' home	178
Svend	Male	69	1	Face-to-face	Participants' home	122
Søren	Male	29	1	Face-to-face	Library	132
Tobias	Male	20	3	Online	—	82
Trine	Female	61	3	Face-to-face	Participants' home	137

Appendix 2. Interview guide

Theme	Content/Question
Presentation of researcher	Birgitte Westerskov Dalgas, PhD Student
Presentation of project	Moving Denmark The project aims to gain new insights into adults' movement habits, as well as the influences of motivation, motives/barriers and opportunities on various forms of movement. You have already contributed significantly to the study with your participation in the survey. Then you have been so kind to agree to participate in this follow-up interview as well. Thank you.
Presentation of the content of the interview	Today, I will ask you to tell me your life story, and we will talk about your physical activity habits and motivation within life transitions and lifestyle contexts. There are no right or wrong answers. I am interested in your life and your experiences.
Time frame	The interview will last approximately [?] hours.
Audio recording	I would like to audio record the interview on two Dictaphones. The recordings are only used internally for the purposes of the analysis. Is that okay with you?
Anonymization	Your statements will be de-identified so that people who are not very familiar with you and your life story can't associate them with you.
Volition	It is voluntary for you to participate, and you can withdraw your consent.
Questions	Do you have any questions or comments about the research project or interview?
Consent	Before we begin the interview, I would like to ask: Do you consent to participate in the interview? AND: May I have your consent to use the information and statements you give me in this interview in the papers I will write?
Demography	Will you start out by telling me a bit about yourself? Name, Age, Education, Employment, Family
Chapters of life	Now, we will start focusing on your life story. All people's lives can be written down in a book. I would like you to think about your life as if we were writing a book about it. First, I want to ask you to think about the different chapters in your book. I have a piece of paper here that can help you out. The first column contains the years of your life—from zero, the day you were born, until today. If you start from the day you were born, when does the first chapter end? Put a line there and name the chapter. Then you move on to the next chapters of your life and mark where they start and end, and name the chapter until you reach your current age. You are free to use the number of chapters that suits your life. Now, we will take a closer look at each of your chapters. The focus will be on: How you moved How you were motivated The impact of the social context in which you lived.
Behavior questions	How did you do in this chapter of your life? Did you do any physical activity during this chapter of your life?
Transport	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? What did your family and friends think about you [activity]? Was it normal to [activity] where you lived?
Occupation	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? Did you feel skilled at [activity]? Did feel that you were able to develop your skills? What did your peers think about [activity]?
Household	Whose choice was it, that you [activity]? Did you like doing [activity]? Why (not)? Did you feel skilled at [activity]? What did your family and friends think about you [activity]? Was it normal to [activity] where you lived?
Recreation	Why did you [activity]? Whose choice was it, that you [activity]? Do you think that, doing [the activity] reflected what you wanted and who you were? Did you feel skilled at [activity]? Did feel that you were able to develop your skills? Was it normal to [activity] where you lived? Who introduced [activity] to you? What did your family and friends think about your engagement in [activity]? Did you feel that you were a part of a community?
Comments to add	Do you have any comments to add?
Thanks	Thank you for your story, and answers on my questions.
And now ...	What will happen now is that the audio recording will be transcribed and then the interview will subsequently be analysed. The analysis will result in articles which hopefully will be published in international scientific journals. Otherwise, feel free to contact us later if you have questions, comments, or concerns.

