

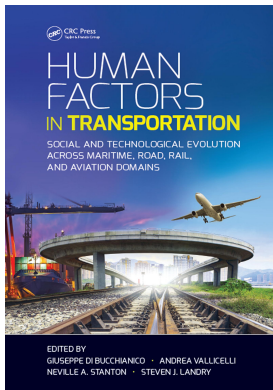
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## **Human Factors in Transportation Social and Technological Evolution Across Maritime, Road, Rail, and Aviation Domains**

Giuseppe Di Bucchianico, Andrea Vallicelli, Neville A. Stanton, Steven J. Landry

### **Aircraft Seat Comfort Experience**

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# 28

## *Aircraft Seat Comfort Experience*

Naseem Ahmadpour, Jean-Marc Robert, and Gitte Lindgaard

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### 28.1 Introduction

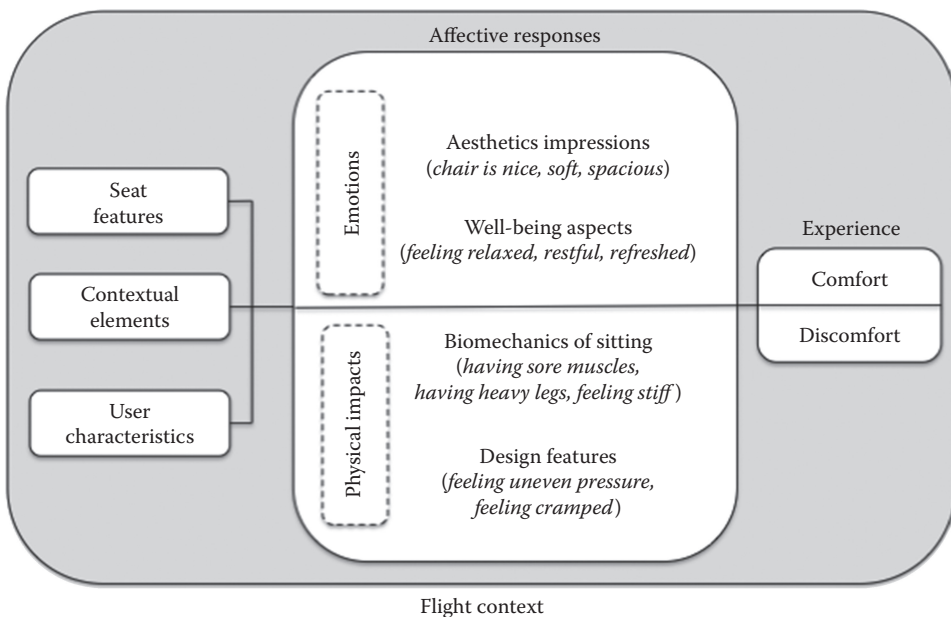
The design of the aircraft seat for commercial aircrafts is becoming progressively important for the airline and aerospace industry. On one hand, there are manufacturing considerations with regard to meeting standards and safety regulations, the choice of lightweight material that contributes to reducing aircraft fuel consumption and consequently environmental impacts, as well as the size and form of seats which dictate the number of passengers on board. On the other hand, seat design has a significant influence on passenger comfort and well-being (Vink et al., 2012) and impacts their purchasing decisions and choice of airline (Brauer, 2004). Therefore it is becoming increasingly challenging to design seats that are safe, comfortable, and offer a pleasurable experience to the occupants.

Seat comfort is often defined as personal and subjective, pertaining to a harmony between physical and psychological aspects of the experience (De Looze et al., 2003). Moreover it has been linked to the experience (Ahmadpour et al., 2014a) and perception (Vink and Hallbeck, 2012). The term “comfort experience” was coined as the result (Vink et al., 2005), characterized as an experience beyond the physical interaction (Helander, 2003) and with added hedonic qualities (Hancock et al., 2005). Design for comfort experience is subsequently proposed as an approach that goes beyond ergonomics and toward delivering enhanced pleasing experiences. Several studies provided conceptual information about the experiential aspects of seat comfort. These aspects are commonly subjective and described in terms to the users’ feelings or affective responses. For example, Helander and Zhang (1997) discussed the office chair comfort experience in association to feeling relief and relaxed.

In the field of transportation, Coelho and Dahlman (2002) disclosed a relationship between car seat comfort and pleasure. Kamp (2012) showed that a perfect car seat elicits pleasant emotions with a minimal level of activation (e.g., excitement) and highlighted the occupant's experience of "relaxedness." Hiemstra-van Mastrigt et al. (2015) suggested that car seats with integrated active seating systems in the back rest results in occupants feeling more "refreshed" and therefore more comfortable.

The above studies highlight the importance of the pleasurable aspects of the comfort experience for the seat design. However, some researchers have expressed concern about the applicability of those results to the design of the aircraft seat due to the highly different nature of the flight context and diversity of passenger activities (Hiemstra-van Mastrigt, 2015). Therefore, further investigation is critical in order to characterize the experiential aspects of the seat in the context of the flight and their impact on passengers' overall comfort. Acquiring such knowledge could inform designers about various aspects of passenger reactions to the design elements, enabling them to develop innovative concepts that not only respond to the ergonomics requirement of the seat (e.g., physical fit) but also promote positive experiences such as relief, pleasure, etc. One objective of this chapter is to identify those aspects of passengers' experience that are linked to seat comfort in the economy class of commercial flights. This however cannot be achieved before addressing a theoretical issue that follows.

Several researchers (Helander and Zhang, 1997; De Looze et al., 2003; Helander, 2003) raised concern about the differences between the seat comfort and discomfort experiences. Helander (2003) speculated that the interaction of a user with a seat in a use context results in a number of affective responses (i.e., feelings), some of which are associated with the comfort experience while the others are linked to the discomfort experience. De Looze et al. (2003) added that discomfort results from the physical impact of the seat on the occupant's body whereas comfort is linked to emotions. The relationship among those variables is illustrated in Figure 28.1.



**FIGURE 28.1**

A model of seat comfort and discomfort experience based on Helander (2003) and De Looze (2003).

As shown in Figure 28.1, comfort experience is characterized in terms of positive affects pertaining to aesthetic impressions (e.g., luxurious, plush) and well-being aspects (e.g., feeling refreshed, feeling at ease). Discomfort experience is described in relation to the biomechanics of sitting (e.g., having sore muscles or heavy legs, feeling stiff) and design features (e.g., feeling uneven pressure, feeling cramped). Helander (2003) followed that seat comfort is experienced independently of discomfort and thus should be evaluated on the basis of a different set of criteria, as noted above.

Given that aircraft passengers spend the majority of their flight time seated, an investigation into the above hypothesis is necessary as it may have implications for the design of both the cabin environment and the seat. Therefore, in this chapter, we will first assess passengers' experiences of comfort and discomfort with the objective of establishing any potential differences among the underlying components of those.

The study presented in this chapter follows the results of a previous inquiry (Ahmadpour et al., 2014a) into the experiential aspects of passenger comfort in commercial aircrafts. A summary of that study follows.

### 28.1.1 The Thematic Components of Passenger Comfort

In an empirical study, Ahmadpour et al. (2014a) collected data from 155 passengers of commercial flights in the economy class who gave written accounts of their comfort experiences. A content analysis of those reports was performed and eight subjective themes were identified in order to describe passengers' experiences of the aircraft cabin interior features (e.g., seat). Subsequently participants' concerns in relation to each of those themes were identified. The themes and concerns are shown in Figure 28.2. The themes "peace of

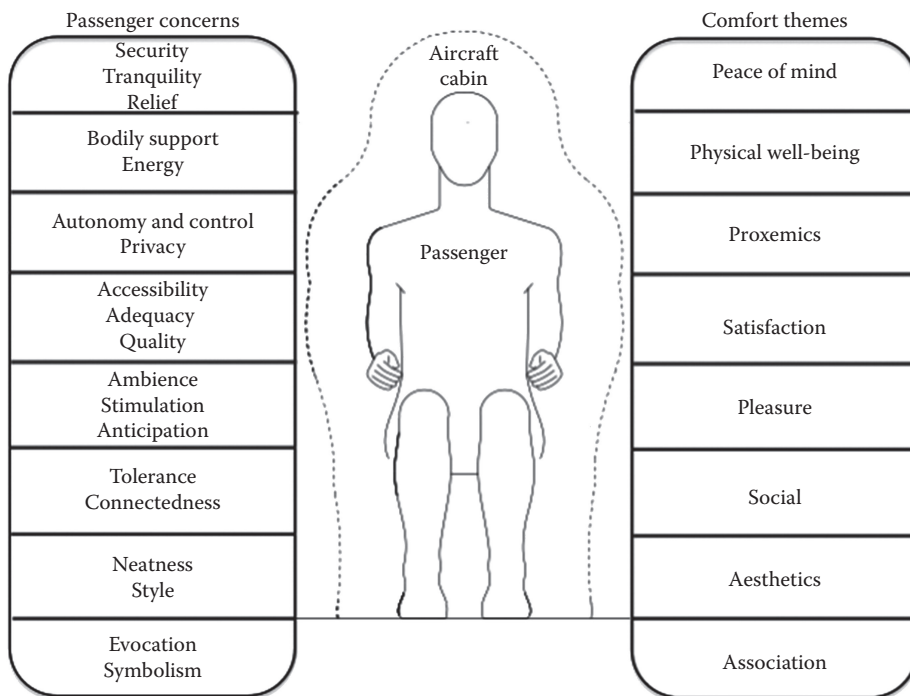


FIGURE 28.2 Aircraft passenger concerns and comfort themes.

mind” and “physical well-being” were identified as the most important themes, based on the frequency with which participants had mentioned them. The theme “association” was mentioned least frequently.

“Peace of mind” signifies the psychological aspect of passenger comfort and concerns for security (e.g., having everything needed), tranquility (e.g., feeling calm when not exposed to any excessive noise), and relief (e.g., not hitting the head on the luggage bin when getting in and out of the seat). “Physical well-being” exemplifies passengers’ experience of the physical impacts (e.g., pain, soreness) on their body and the level of energy they feel (e.g., the air feels fresh).

“Proxemics” in the context of flight subscribes to one’s experience of personal space and concerns for control (e.g., to make adjustments, to perform activities) and privacy (e.g., not disturbed when resting). “Satisfaction” is described in terms of the cabin’s usability and whether it fulfills passengers’ expectations with regard to accessibility (to cabin element, e.g., entertainment unit, seat control), adequacy (of cabin features e.g., seat recline function), and quality (e.g., of announcement sound). The theme “pleasure” concerns the extent to which passenger anticipations are exceeded (e.g., by surprising service elements), the cabin ambience (e.g., warm, welcoming) and stimulation (e.g., entertainment). The theme “social” concerns the inter-personal interactions and a balance between those that one has to tolerate (particularly those that are disturbing) and those connections that are favorable (e.g., empathetic human contacts). “Aesthetics” aspects concern neatness (e.g., cleanliness of the cabin, its maintenance) and style (e.g., colors). The theme “association” concerns the representational elements of the environment in terms of familiarity (e.g., a seat that resembles a comfortable lounge chair) and desirability (e.g., service as good as in first class).

Furthermore, the study uncovered 22 cabin interior elements. It was shown that 80% of participants identified the seat as the central determinant of their flight comfort experience. This was followed by six other cabin elements, as shown in [Figure 28.3](#), all of which had been mentioned by at least 20% of participants. Those were legroom (64%), in-flight entertainment—IFE (37%), temperature (33%), activity (28%), noise (28%), and service (22%).

The above results necessitate further research into the comfort experience associated with the aircraft seat. The study presented in this chapter aims to provide an insight into that experience by investigating two main questions as follows:

Question 1: What are the differences between the aircraft passengers’ comfort and discomfort experiences in the cabin environment?

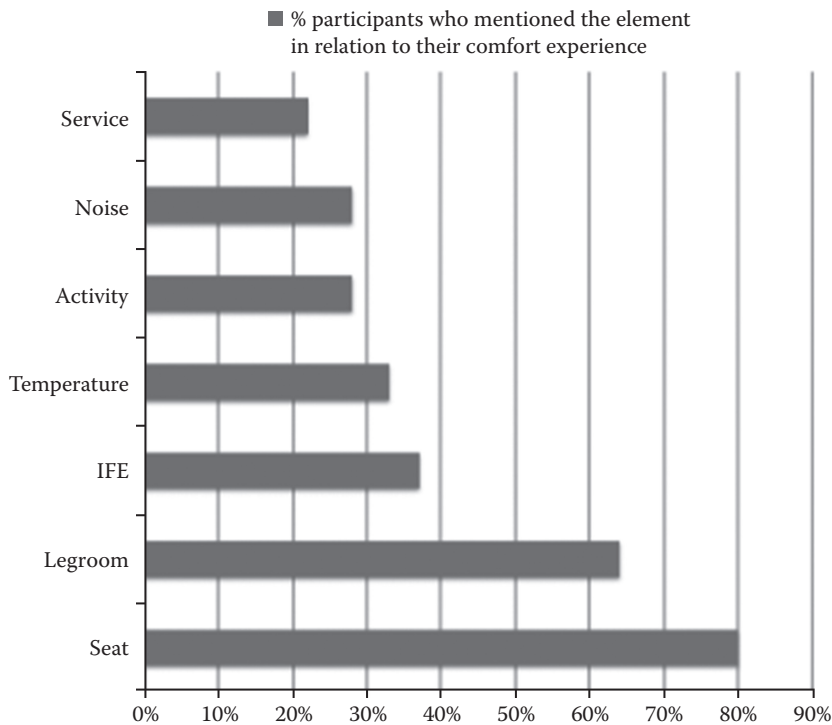
Question 2: What types of experience are associated with aircraft seat comfort? The previous study (Ahmadpour et al., 2014a) gave indications about the eight themes of overall passenger comfort experience. The aim of the study presented in this chapter is to identify the themes that are relevant to the comfort experience of the seat.

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## 28.2 Method

### 28.2.1 Participants

A convenience sample of 27 participants (15 males) was obtained. Of those, 20 were aged 18–34 and the rest 35–55. The mean height was 174 (150–193) cm and none of the participants had disabilities. All participants had more than five flight experiences in the past.



**FIGURE 28.3**

Seven cabin elements, which have been mentioned by above 20% of participants in relation to their comfort experience in the aircraft cabin.

They were informed that they would be asked to share details about an economy class flight experience that had taken place within the past 2 years. A total of 54 reports were then obtained, of which 44 concerned long flights (>4 hour long) and the rest were short flights (<4 hour long).

### 28.2.2 Questionnaire

Respondents received a link to an online questionnaire via email. The questionnaire consisted of questions inquiring about age, gender, height, disability, previous flights experiences (never/1–5 times/more than 5 times), an open-end question about details of a comfortable flight experience followed by a similar question about an uncomfortable flight experience in the economy class. Then the respondents were requested to give ratings on the influence of each of the eight themes (as summarized in Introduction) on both of those experiences using a 5-point scale ranging from slightly influential to highly influential. A short description of each theme and the types of concerns associated with each were also provided. Respondents were instructed to leave the rating section blank if a theme had no impact on their experience. A comment section was provided at the end of the questionnaire for the respondents to specify any aspect of their experience that was not covered by the eight proposed themes. Finally, respondents were informed that the principle investigator would contact them for a follow-up interview in order to collect more in-depth account of their responses.

### 28.2.3 Interview

Interviews were conducted within 14 days from the date an online report was submitted. At the beginning of the interviews, respondents were provided with an operational definition of comfort as “a pleasant state of well-being and ease whereby there is a physical, physiological and psychological harmony between a person and the environment.” This was followed by a definition of discomfort as “a state whereby one experiences hardship of some sort which could be physical, physiological or psychological.” Those descriptions were formulated based on the discussion of Ahmadpour et al. (2014a). Next, respondents were asked to specify whether they reported long or short flights in their submitted reports, as this question was missing from the initial questionnaire. During the interview, each respondent was first asked to read their responses to the open-end questions and then give more details about them including their feelings, attitudes, concerns, and reactions to the environmental elements such as the seat. A laddering technique (Jordan, 2000) was adopted to achieve a better understanding of the respondents’ experiences. This included the investigator repeatedly asking “why” following each statement. The probing continued until the investigator believed the respondent had revealed their concerns and reactions associated with different aspects of their comfort and discomfort experiences. The interview ended with a review of the ratings given on eight themes. The respondents were then requested to provide justifications for each of those ratings.

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## 28.3 Analysis and Results

The data analysis included identifying the descriptions and environmental elements that influenced passenger comfort and discomfort to some extent. However, we only report those related to the seat in this chapter. The full report is published by Ahmadpour et al. (2016a).

### 28.3.1 Differences between Comfort and Discomfort Experiences

To examine the differences between the ratings on the eight themes in relation to comfort and discomfort experiences, a Wilcoxon signed-rank test was performed. Significant differences ( $p < 0.001$ ) were found between ratings given on themes “physical well-being” and “pleasure” in the comfort and discomfort reports. The ratings on all other themes exhibited no significant differences. Next the average ratings and standard deviation on each theme were computed for comfort and discomfort reports separately as summarized in [Table 28.1](#).

The theme “pleasure” was rated the highest in reports of comfort experience whereas the themes “physical well-being” received higher ratings in reports of discomfort experience. The ratings placed the theme “peace of mind” second to the highest in both comfort and discomfort reports, confirming the importance of psychological well-being for both experiences. The theme “association” was similarly rated the least influential in both groups.

Given that six out of the eight themes did not demonstrate any significant differences in the ratings, it was decided to consider the eight themes as representative of both the comfort and discomfort experiences throughout the rest of this study. This means the overall passenger comfort is viewed as a phenomenon that is stretched across a range of



**TABLE 28.1**  
 The Mean Ratings (SD) of Eight Themes (1-Slightly Influential to 5-Highly Influential) Associated with Comfort and Discomfort Experiences (N = 27) Separately and Combined

	Pleasure	Peace of Mind	Proxemics	Physical Well-Being	Satisfaction	Social	Aesthetics	Association
Mean ratings (SD) in comfort reports	3.0(1.9)	2.9(2.2)	2.3(2.2)	2.1(2.1)	1.6(1.8)	1.5(1.9)	1.2(1.8)	0.8(1.4)
Mean ratings (SD) in discomfort reports	0.6(1.3)	3.4(1.5)	1.6(2.0)	4.0(1.5)	2.1(2.1)	1.9(2.2)	0.5(1.3)	0.3(0.8)
Mean (SD) of comfort and discomfort reports together	1.8(1.2)	3.2(0.3)	2.0(0.4)	3.1(1.0)	1.9(0.3)	1.7(0.2)	0.9(0.4)	0.6(0.3)



experiences, from a negative state of discomfort to a positive state of comfort with a neutral state in between. This phenomenon could be described in terms of eight experiential themes, for example, physical well-being, pleasure, peace of mind, etc. For this reason, comfort and discomfort experiences are not differentiated through the rest of this chapter.

Subsequently, the overall influence of the eight themes on the overall comfort experience was calculated based on combining all ratings obtained for each theme and then calculating the mean (SD) value. This is reported in the last row of [Table 28.1](#). The results confirmed the rank order of comfort themes reported by Ahmadpour et al. (2014a) (see [Figure 28.2](#)) introducing “peace of mind” and “physical well-being” as highly influential on passenger comfort followed by “proxemics,” “satisfaction,” “pleasure,” “social,” “aesthetics,” and “association,” respectively.

### 28.3.2 Impact of the Seat on Comfort Experience

Next, a content analysis was conducted on respondents’ reports. The procedure included first eliciting travel descriptions in relation to the seat. Second, those descriptions were inspected carefully and the passenger comfort themes relevant to each seat description were identified.

The first step revealed that 18 respondents had mentioned the seat at least once in their reports in connection to an experience of comfort (or discomfort). Among those,  $N = 11$  were male,  $N = 13$  were aged 18–34 years old, and  $N = 5$  were aged 35–55. The average height of those participants was 174 (152–193,  $SD = 10$ ) cm. The number and demographic information of those respondents who mentioned the seat in their reports is summarized in the first row of [Table 28.2](#). The information about those who did not mention the seat at all is given in the second row of the table.

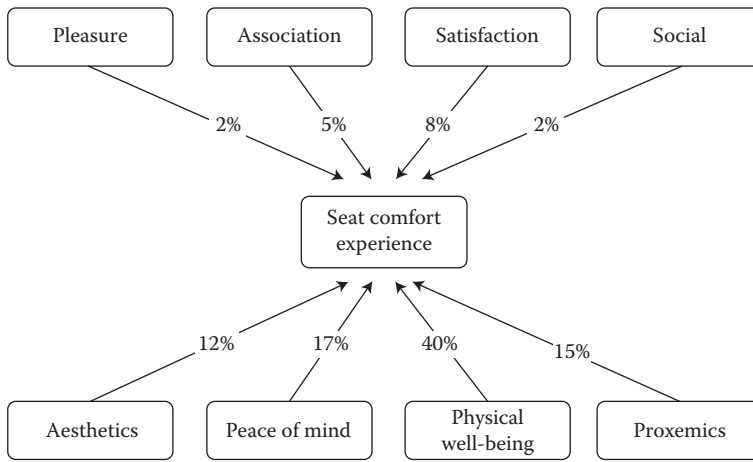
In the second step, the themes relevant to those seat-related descriptions were identified from the verbatim interview transcripts and then counted. A description was counted once if the seat was mentioned in relation to only one comfort theme throughout a report (comfort and discomfort experiences combined). A description was counted several times if it was mentioned in relation to different themes in a report. As an example, when a respondent mentioned the seat once in relation to its social aspect and another time in relation to its physical [well-being] aspect, it was counted twice. The results of this step yielded 52 seat-related descriptions.

The seat was described most frequently in relation to “physical well-being” (21 description, 40% of all seat descriptions) and least frequently in relation to “pleasure” and “social” (1 description, 2% of all seat descriptions) themes. The themes “physical well-being,”

**TABLE 28.2**

Number and Descriptions of Respondents Who Mentioned the Seat in Relation to Their Comfort Experience as Opposed to Those Who Did Not Mention It At All

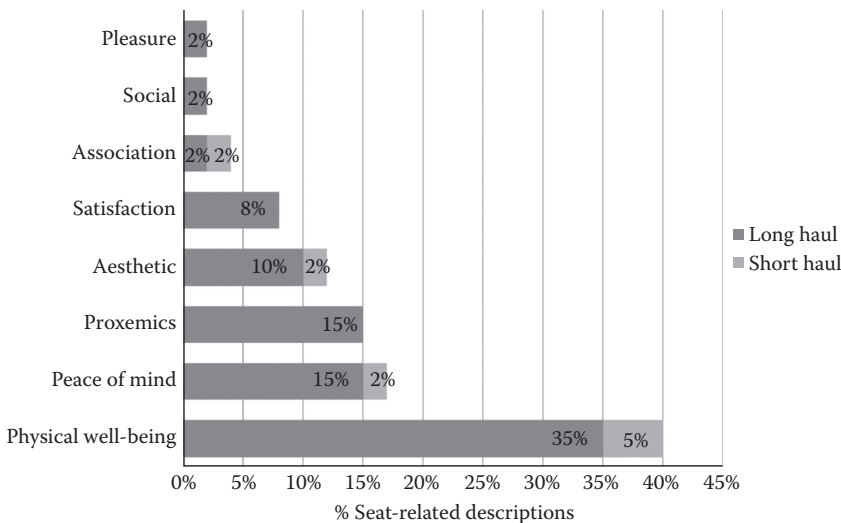
	N	Male	Female	Age (Years Old)		Height (cm)
				18–34	35–55	Mean (SD)
Seat mentioned in relation to at a comfort theme	18	11	7	13	5	174(10)
Seat not mentioned in relation to the comfort experience	9	4	5	7	2	172(12)
Total	27	15	12	20	7	174(10)



**FIGURE 28.4**  
The overall influence of the eight comfort themes on seat comfort experience.

“peace of mind,” “proxemics,” and “aesthetics” accounted for 84% of all seat descriptions combined. These results are summarized in Figure 28.4. The result also revealed that 46 (88.5%) of the seat descriptions were related to long-haul (>4 hour) flights while only 6 (11.5%) were linked to short-haul (<4 hour) flights. The percentages of long- versus short-haul flights descriptions were calculated for each theme and shown in Figure 28.5 in different colors. The themes “proxemics,” “social,” and “pleasure” were only mentioned in relation to long-haul flights.

A Pearson product-moment correlation was performed to highlight the relationship between the heights of respondents who had mentioned the seat in relation to their comfort



**FIGURE 28.5**  
The seat descriptions (in total 52) that are linked to the eight passenger comfort themes on long- and short-haul flights based on flight comfort and discomfort reports of 27 participants.

experience and the ratings they had provided on the eight comfort themes. Significant correlation ( $p < 0.05$ ,  $r = 0.4$ ) was found between the height and ratings on the theme “physical well-being.” This implies that a person’s height is mainly linked to their perceived physical comfort of the seat however it may not influence other aspects of their seat experience. Moreover, it suggests that the bodily fit of the seat has a higher value for taller passengers.

Finally the respondents’ concerns in relation to the elicited seat descriptions and the themes associated with those were identified. These are summarized in [Table 28.3](#). Several differences were observed between the list of concerns generated for the seat and the overall comfort initially introduced by Ahmadpour et al. (2014a) as follows:

1. It was shown that the “physical well-being” experience of the seat was mainly concerned with the bodily support, leaving out concerns for energy. Recurrent descriptions relevant to that theme included the fit of the backrest to the spine curve, absence of cramps and pains, no sharp corners or edges, etc.
2. The concern for symbolism and experiences of higher values was not observed in the “association” theme. Participants’ concerns in relation to this theme were limited to “evocation,” that is, being reminded of familiar situations such as sitting in the car or a hotel lounge.

**TABLE 28.3**

Recurrent Passenger Concerns and Comfort Themes in Relation to the Seat Experience

Theme	Common Seat Descriptions	Concern
Physical well-being	No pain/cramp, back curve fits to the backrest, not to have to stack pillows to adjust to backrest curvature, easy to move, seat pan is not slippery, no sharp edges.	Bodily support
Peace of mind	Feeling at ease, no worry, not feeling confined, feels airy, able to store personal stuff, not feeling irritated and fidgety.	Security
	Supporting the head and neck (headrest ears) so that head does not fall off in sleep.	Tranquility
	Smooth recline, easy to position for sleep, able to lean against something to sleep.	Relief
Proxemics	Have an arm rest for myself, freely recline and control position with no worry, able to adjust and personalize the headrest.	Control
	No physical contact with neighbors, proper separation under armrest, not feeling squeezed by neighbors, feeling of having a personal space, like a cocoon.	Privacy
Aesthetics	Looks new/refurbished (vs. old/worn out), clean (no food crumbs, nor tears on covers).	Neatness
	Nice seat covers, bright colors, seat cover feels nice to touch.	Style
	Working well, solid, functioning design (no broken parts, no malfunction).	Quality
Satisfaction	Good recline system, well-designed and makes sense, confirms to a non-paying child needs, sufficiently enables comfortable eating and working.	Adequacy
	Buttons on the seat are well-placed, radio button could not be pushed accidentally.	Accessibility
Association	Feels like sitting in a hotel lounge, feels like sitting in the car.	Evocation
Pleasure	Pleasant surprise, seat feels wider than usual. Cozy and inviting, modern (wood parts).	Anticipation Ambience
Social	Ability to hold hands over the low armrest.	Connectedness

3. The social experience of the seat was solely concerned with connectedness to others, for example, holding hands with one's spouse. However, the concern for intolerable interactions was not mentioned in relation to the seat.

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## 28.4 Discussion

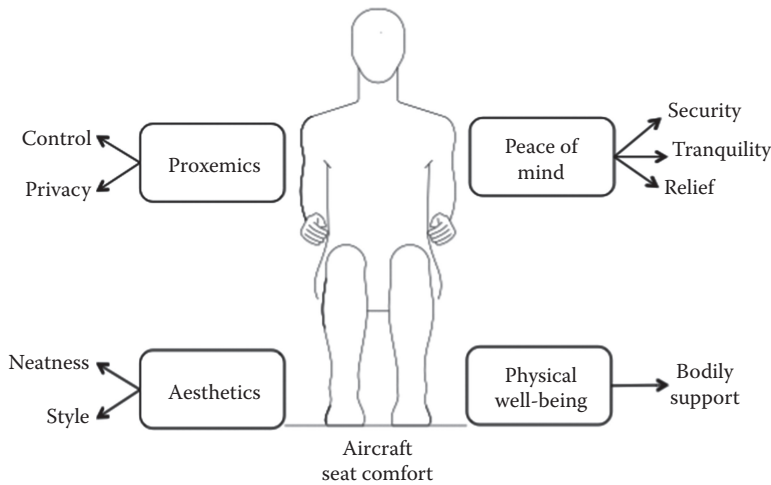
An in-depth inquiry was performed in order to obtain insight into the passenger comfort experience in the economy class of commercial aircrafts. Ratings on the eight thematic components of passenger comfort showed good fit to both comfort and discomfort experiences, implying that passengers may perceive those two experiences on the basis of the same components. That contradicts the proposition that comfort and discomfort, when they involve the seat, are independent entities underlined by different sets of variables (De Looze et al., 2003; Helander, 2003). However, the contradictory result obtained from our study may be due to the influence of the contextual elements of the flight, for example, legroom, IFE, temperature, activity, noise, service, etc. In addition, the social setting of the flight and the proximity of passengers to one another are different from the office environment used in Helander's study.

The differences between the ratings on themes "pleasure" and "physical well-being" suggest that enhancing the pleasant aspects of the flight highly improves passenger comfort experience whereas lack of physical well-being diminishes that experience more than any other theme. Therefore, an emphasis must be put on these themes in the design of the cabin environment. Pleasant aspects of the flight subscribe to exceeding passengers' anticipations, providing a nice ambience, entertainment, and stimulation in the flight context. Physical well-being is determined by the physical fit of the space to the passenger body and improving their level of energy.

Once the issue of differentiating comfort and discomfort was resolved, the average ratings obtained from the combined effects of the experiential themes confirmed their rank order from the previous study (Ahmadpour et al., 2014a). The outcome highlighted "peace of mind" and "physical well-being" as the most influential aspects of the experience for passenger comfort.

Previously, Ahmadpour et al. (2014a) suggested that the seat is central to most experiential aspects of passengers' comfort experience. This was confirmed by the study in this chapter. Four themes namely "physical well-being," "peace of mind," "proxemics," and "aesthetics" were mentioned more frequently when seat comfort was reported (accounting for 84% of seat comments). The theme "pleasure" was mentioned least frequently in those reports confirming the arguments of Ahmadpour et al. (2014a) that the entertainment units and service are the main determinants of the pleasure aspects of passenger experiences. The "social" aspects of the seat experience were similarly minimal in the reports. This was also suggested by Ahmadpour et al. (2015b), who examined those differences in a study that compared the social aspects of passenger comfort experience to the proxemics aspects (i.e., concerned with control and privacy). They revealed that sitting habits and sitting preferences are mainly important for the experience of privacy especially for those traveling alone (i.e., without companions).

The result indicated that physical comfort only accounts for 40% of seat comfort (see [Figure 28.5](#)). This result has implication for the seat design in that it suggests a focus on the non-physical aspects of the seat experience, particularly "peace of mind," "proxemics," "aesthetics," and passengers concerns associated with those aspects as shown in [Figure 28.6](#).

**FIGURE 28.6**

The four main themes of aircraft seat comfort experience and passenger concerns associated to each.

As an example, the seat headrest could be linked to several types of concern as follows: (1) concern for a better bodily support and fit to the working posture particularly when using electronic devices such as laptops and tablets (physical well-being), (2) concern for relief enabling one to sleep or relax whilst leaning against “wings” of the headrest (peace of mind), (3) concern for controlling one’s position by adjusting the headrest (proxemics), (4) concern for the neatness and feel of the headrest cover, for example, softer material (aesthetics).

Among the four themes of aircraft seat comfort experience shown in Figure 28.5, the literature on “proxemics” is scarce and therefore demands further research. The theme was operationally defined as passengers’ impression of the personal space and was connected to concerns for control over their space (e.g., freedom to adjust) and privacy (Ahmadpour et al., 2014a). Earlier, Hall (1966) argued that a distance of 45 cm from others in all direction yields an optimum personal space. While the average medial distance of 71–81 cm in commercial aircrafts complies with Hall’s specification, the lateral distance is usually less than 45 cm and falls short on offering passengers a sense of privacy (Ahmadpour et al., 2014a). Our interviews similarly revealed a general complaint about privacy issues such as physical contact with neighbors in the areas of arms and legs. Increasing the space between adjacent seats in the economy class may significantly reduce the number of seats on the fleet and consequently it may not be feasible. Therefore, other solutions such as proper separation of passengers in those areas should be pursued in order to improve their sense of privacy. Moreover, respondents in our study encouraged the introduction of non-verbal means of communication with others, for example, “do not disturb” sign.

The above propositions do not diminish the importance of physical ergonomics for seat design. Vink and Brauer (2011) previously highlighted a need for better fit of current aircraft seats to the occupant’s body and made recommendations accordingly. However, characterizing seats on the basis of comfort themes suggested by our study provides an opportunity to address a wider range of experiences by seat design. The value of that approach is demonstrated by Kamp (2012) in relation to car seats. She revealed that even when physical support is lacking on the sides of a car seat, we could still generate an experience of relaxedness through other favorable emotional characters.

Aircraft passengers' emotional responses to the cabin interior were examined by Ahmadpour et al. (2014b). It was shown that passengers' seat experience is linked to three groups of emotions. The first group consists of emotions such as disappointment, satisfaction, and relief in response to how passengers' expectations (for the seat) were met. Those expectations were similar to concerns for peace of mind (e.g., security) and satisfaction (e.g., adequacy of the design for working, sleeping, and other activities) that are presented in this study. The second group included emotions such as joy, resulting from positive experiences with the seat when passengers did not expect them. Concerns for peace of mind and physical well-being were linked to emotion joy. The third group was attraction emotions such as liking or disliking, elicited due to positive visceral impressions of the seat similar to aesthetics concerns. Ahmadpour et al. (2014b) suggested that information about passengers' concerns is essential for improving the emotional experience of the seat. The study in this chapter contributes to a better understanding of passengers' concerns with regard to the seat and the outcomes provide context for the emotional model of passengers introduced by Ahmadpour et al. (2014b).

The study presented in this chapter was carried out with the intention of exploring the content and nature of the seat comfort experience in economy class. However, some limitations of the study such as the disproportional number of participants on long-haul flights prevent us from drawing any firm conclusions in that regard. Future research should overcome this limitation by employing a larger sample of participants.

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## 28.5 Conclusion

Aircraft passenger comfort and discomfort experiences are not two independent entities but rather they are understood as opposite sides of a holistic experience. Passenger comfort could be described as an experience ranging from extreme discomfort to extreme comfort, underlined by eight themes. The relationship between the seat and the themes of the passenger comfort experience was examined. It is concluded that four themes namely "physical well-being," "peace of mind," "proxemics," and "aesthetics" are the most prominent aspects of aircraft seat comfort. Applying this insight into the seat design is expected to improve the seat comfort experience.

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